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Some Fundamental Aspects of Silk Hosiery Dyeing

By LOUIS S. ZISMAN

Gotham Silk Hosiery Co., Inc.

At present, highly competitive conditions in the textile industry have brought the dyer many apparently new problems through the continual struggle to create new and different products.

THE problems, which apparently at first glance, present entirely new difficulties, will when carefully analyzed, most often be found to be due to the overlooking of fundamentals which have been forgotten. It is true, of course, that changes in styles of silk hosiery have called for a more complete knowledge of the soaking process, degumming, dyeing, finishing and their related chemicals, soaps, oils, dyes, gums, waxes, penetrants, etc. This knowledge, however, can all be obtained from our past experience, although we have perhaps not sufficiently studied or applied it in the light of more recent knowledge. In other words, more applied chemistry is needed today than ever before in the dyeing of silk stockings, but if we keep fundamentals in mind, we will find that the new problems of today are not greatly different from those we have solved yesterday.

The Soaking Process

The final result of a finished stocking depends to a large extent on the preliminary treatment of raw silk and for that reason an intelligent understanding of the Soaking Process is essential. The main function of the Soaking Process is to impart to raw silk the required condition of softness and hygroscopicity so as to facilitate the throwing and knitting operations that follow, not only facilitate but make possible a stocking of uniform stitch, texture and clarity.

The materials used for soaking are many and in varied combinations. They include olive oil soap, neatsfoot and mineral oils, and sulphonated products of olive, castor, neatsfoot, mineral and coconut oils. There is no universal standard method for any given type of silk. Each throwster has his own pet formula. Perhaps the most common method known and still used by many mills is an emulsion of neatsfoot or olive oil in olive oil soap, but the introduction of high twist yarns for hosiery and also the adoption of soaking machinery to replace the old tub method have necessitated certain changes in materials used, therefore any number of new combinations have been tried. Such changes very often led to the use of some oil combinations which were not properly prepared or not self emulsifiable, giving rise to certain oily spot troubles in the subsequent dyehouse processing. Unless the dyer was acquainted with the soaking materials used, he would be at a loss to account for those spots and probably blame everything but the right thing.

Dyes used as throwster's tints for identifying different silks are applied in the soaking bath. Owing to a wide range of yarns in demand, the throwsters have been called upon to use a greater variety of tints and because of a rather limited supply which are suitable, some of the dyes used are not wholly satisfactory both from the standpoint of evenness and complete removal in the boil off. We can therefore realize the necessity for further investigation in this matter.

The Boil Off or Degumming Process

When high twist yarns or grenadines first made their appearance in hosiery certain difficulties were experienced in the boil off and dyeing. Naturally with more silk present in a highly twisted condition, the removal of the silk gum or sericin required a stiffer boil off. The silk hosiery dyer had to experiment and learn what the silk piece goods dyer already knew, for high twist yarns, crepes, and similar fabrics were nothing new in the piece goods trade.

The old idea of using a high grade neutral olive oil soap

for degumming still meets with much favor today. The removal of silk gum or sericin depends upon its attack by alkali. We must bear in mind that this attack should be fairly rapid in the beginning but slow and gradual towards the end, otherwise the silk fibroin itself whose chemical constitution is not far different from the silk gum, will be acted upon. A good soap has the very desirable feature of giving up its alkali gradually due to a comparatively slow rate of hydrolysis when subjected to water and heat.

The use of alkalies with soap or alkaline degumming oils of varying degrees of causticity to hasten the degumming is not recommended. If this procedure is carried out the utmost caution should be exercised in the amount of alkali used, and in the control of time and temperature of the degumming bath. Instead, it is much better and safer to use a double boil off with neutral soap or increase the amount of soap. It is permissible, however, and very often desirable to give a preliminary scour or partial boil off with a small percent of soap and mild alkali for a short period, dump the liquor, and start the regular boil off. This method will not only assist a difficult boil off but will help to emulsify or saponify some of the soaking oils which are not entirely removed in one degumming bath.

Advantages of the One Bath Method

The one bath method of dyeing and degumming if mastered, seems to be very well adapted for the dyeing of hosiery manufactured from high twist silk. The process lends itself to more complete penetration and level dyeing without using the various penetrants and dyeing assistants that are so prevalent on the market today. If the process is under control chafing is also reduced to a minimum inasmuch as the total time goods are agitated in the machines is less than the time required by the two bath method, which embodies two operations, namely boiling off first and dyeing afterwards.

Application of Finishes

Most finishes applied to stockings after dyeing are more or less superficial, i. e., they come off completely in one or more washings. The particular type of finish required is more a matter for the Sales Department then for the dyer to decide. A stocking made well and dyed well really doesn't require any of the finishing preparations, since the natural softness, elasticity, and handle should exist upon completion of the dyeing operation. There are cases, however, where certain added features are desirable, for example, in chiffons a gum finish will help to retain the shape of the stocking in handling and boxing. In light weight hosiery where an added fullness is required an extra dose of gum or gelatine softened up by a smaller amount of a high grade sulphonated olive or mineral oil will bring about the desired effect. In heavier weights, high twist stockings may appear a little too firm or hard due to the high twist; in that case a touch of good softening oil might be advisable.

The rather shiny appearance of tram as compared with grenadines has led to delustering the former with varying degrees of success. For this purpose many materials were tried including impalpable talcs, precipitated barium sulphate, titanium oxides fixed with gums and softened with oils and colloidal waxes set by acetate of aluminum. The success of any method depends as much on the technique and manner of manipulation as upon the purity and fineness of materials used.

NEW PATENTS

(*Abstracted by Synthetic Organic Chem. Mfrs. Assn.*)

Sulphur Dyes of the Anthraquinone Series and Process of Making. (Derived from mercapto-methylanthraquinones; dye cotton from an olive hydrosulphite vat clear orange yellow shades.) Filip Kacer, of Mannheim, Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,841,817, January 19, 1932.

Manufacture of Polyazo-Dyestuffs. (Consists in coupling a tetrazotized diamine of the diaryl series in mineral acid solution with 1:8-amino naphthol-3:6-disulphonic acid, combining with a mono diazo-compound and a meta amino phenol or derivatives; dye wool, silk and viscose mixture equal black shades.) Hans Leemann, Heinrich Lier, and Oscar Knecht, of Basel, Switzerland, assignors to Chemical Works, formerly Sandoz, of Basel, Switzerland, No. 1,841,828, Jan. 19, 1932.

Preparation of Mordant Disazo-Dyestuffs. (A division of application Ser. No. 120,251, filed July 2, 1926. Consists in coupling para-nitraniline sulfonic acid with salicylic acid, reducing the nitro group, and again coupling with salicylic; dye chromed wool orange with a brown tone and when printed with a chrome mordant on cotton give a strong orange shade with a red tone.) Ernst Bodmer, of Basel, Switzerland, assignor to the firm of Durand & Huguenin S. A., of Basel, Switzerland, No. 841,873, January 19, 1932.

Oil-Soluble-Dye and Process of Making the Same. (Comprises causing an organic dyestuff containing a basic group to react with an oil-soluble sulphonic acid derived from the treatment of a petroleum oil with fuming sulphuric acid or sulphuric anhydrid.) Hyym E. Buc, of Roselle, N. J., assignor to Standard Oil Development Co., No. 1,841,876, January 19, 1932.

Manufacture of Vat Dyestuffs. (Allo-ms-naphthodianthrones, also useful as dyestuff intermediates, obtained by subjecting 2.2'-dimethyl-ms-benzianthrone or its derivatives to alkaline condensing agents; dye cotton bluish violet, golden yellow, orange and red shades.) Max Albert Kunz, of Mannheim, and Karl Koberle, of Ludwigshafen-on-the-Rhine, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,841,961, January 19, 1932.

Production of Vat Dyestuffs. (A division of above Patent No. 1,841,961.) Max Albert Kunz, of Mannheim, and Karl Koberle, of Ludwigshafen-on-the-Rhine, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,841,962, January 19, 1932.

The Development of Hosiery Dyeing Machinery

By **FERDINAND J. CAYA, B.T.C.**

Hosiery dyeing, as compared to hosiery manufacture, is relatively a new art. Hosiery manufacture was started in England about 1595, when William Lee perfected the knitting machine he had conceived in 1589. The era of color did not occur until the discovery of Mauve by W. H. Perkin in 1856 and the subsequent development of the synthetic dyestuff industry. Excepting instances where vegetable coloring matters were used, hosiery dyeing did not start before this period. It is of interest to note the progress it has made in comparatively so short a time.

AS DYESTUFFS became available, and public demand for colored fabrics became widespread, the hosiery manufacturer turned his attention to this phase of further enhancing the beauty of his product. An unused corner of the mill, or possibly a vacant shed was converted into a dye-house. Wooden vats were installed, steam lines and water pipes were connected to the vats, and dyeing operations began. The range of colors at that time was not very wide. As one looks back one may remember that the range consisted of black, white, blue and brown—black predominating. During the period the principal materials used for hosiery were cotton and wool. The hosiery was dyed by moving the goods through the dye liquor in the vats by means of wooden poles. This crude manner of operation and lack of knowledge in the application of dyestuffs meant rather poor results. This, nevertheless, marked the beginning of hosiery dyeing, and one was not too critical even when lack of penetration, uneven dyeing, and spotted goods were all too evident.

Development of Hosiery Dyeing Machines

The great strides made in the growth of the dyestuff industry was accompanied by a development of dyeing machines. The development of hosiery dyeing machines has become one of the outstanding achievements, and has served as an incentive in the general advancement of the dyeing industry as a whole. The laborious method of imparting color to hosiery, as first used, was followed by a period of mechanical adaptations, with makeshift arrangements and inexpensive machinery. Typical of these was a machine, characteristically called the "Tom-Tom," consisting of a vat equipped with mechanically operated wooden hammers. This was used quite extensively in the dyeing of Oxidized or Aniline blacks. Another step was that of equipping the vats with coarse wooden paddles, by which means the goods were propelled through the dye liquor, a principle still in some use today in the so-called Paddle machine. At about the same time, a rotary dyeing machine consisting of a perforated wooden cylinder turning within a wooden tank was devised. Later another was constructed, all parts of which were of sheet-iron, and it was widely used in the dyeing of sulphur blacks. Other progress was made by lining the vats and paddle machines with copper or tin sheeting. While these various machines served the purpose in certain instances, they could not be adapted for universal use and they were not at all suited to the dyeing of silk hosiery which was being made in greater quantities. Because of this fact, silk hosiery was generally made of yarn previously dyed in the skein. The great strides made in refinement of hosiery knitting machinery, coupled with an immense growth of the silk hosiery industry, led the makers of dyeing machines to further effort. The equipment of the modern dye-house is evidence of the alertness and aggressiveness with which makers of hosiery dyeing machines tackled the problem of producing machinery suitable for the efficient and successful dyeing of silk hosiery. In the year 1905 Monel Metal was developed. This natural alloy metal is so extensively used today, and its superior qualities are so well known, that there is no need of detailing its properties here. Suffice it to say, that machine manufacturers were foresighted enough to recognize the need of this metal in the dyeing industry. It is a matter of record that the first Monel Metal rotary dyeing machine was made in 1907. At that time it was felt that the rotary type of machine was the best suited for hosiery dyeing, but its development was retarded because of the higher cost of Monel Metal. The adaptability and superiority of this metal was, however, readily determined, and it was used more and more extensively in the making of paddle machines. The long life of Monel Metal can be exemplified by noting that the first Monel Metal machine built in 1907 is still in use. This fact compensates for its higher cost. Today the all Monel Metal rotary type of machine is accepted as the best, and is rapidly replacing the paddle machine especially in dyeing of better quality fabrics.

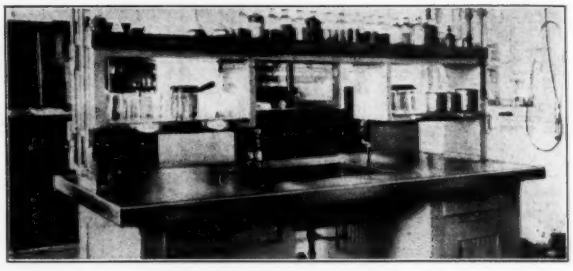
Early type of installation in hosiery dyehouses.

Problems of the Hosiery Dyer

Hosiery dyeing, as we find it today, is an intricate and technical problem. Cotton, wool, silk and the artificial silks are all used, either alone or in combination with one another in the production of hosiery. Combinations of cotton and silk; cotton and wool; cotton and artificial silk; cotton, wool and silk; cotton, silk and artificial silk; cotton, wool and artificial silk are used in attempts to lower manufacturing cost, to imitate fabrics of better quality or in an effort to obtain novel or decorative effects. Immense improvements have been made in manufacture. Hosiery, of a texture and quality unthought of a few years ago, is being made in a great variety of designs. It is dyed in a myriad of shades, which are ever changing, in order that the whims of fashion, and the incessant public demand for colored fabrics may be satisfied. Hosiery, in addition to being a fabric whose primary purpose was that of protection against the elements, has become a product of beauty, one which is styled with the greatest of care, and dyed to match, or blend with daytime or evening dress. Hosiery today is part of the ensemble. Numerous problems present themselves in dyeing, some of which are common to all types, others of which apply to individual types of hosiery.

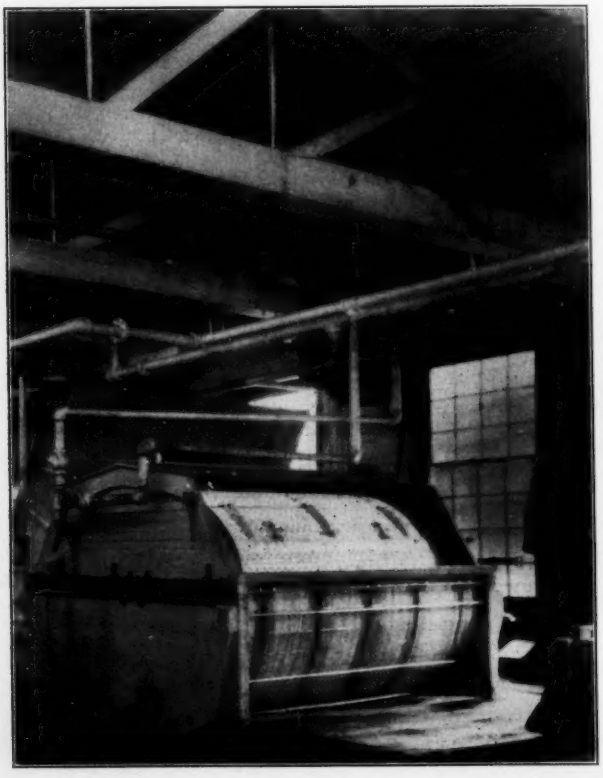
Factors which are particularly in common to all types of hosiery are:

1. Quality
2. Fastness of Colors
3. Clearness of Shade
4. Uniformity
5. Element of time.



Laboratory in a modern hosiery dyehouse.

It is of the utmost importance that the quality of the fabric be unimpaired during the dyeing operation. The chemicals, dyeing assistants such as penetrants and leveling agents, and finishing materials, must be of a nature that will not injure the fiber. The manual, as well as the machine handling of the goods must be done with care in order that neither the construction of the fabric will be distorted, nor the fibers roughened.



Early type of wooden rotary machine for hosiery dyeing.

Showing a typical installation in a modern hosiery dyehouse.

The fastness of colors to washing is considered as the most important, with fastness to perspiration, and fastness to light ranking next. The choice of dyestuffs is dependent on these fastness properties, the ease of application

(Continued on page 268)

Proceedings of the American Association of Textile Chemists and Colorists

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CALENDAR OF COMING EVENTS

Meeting Northern New England Section May 7.

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Meeting New York Section, April 22.

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Council and Research Committee Meetings

April 29, 1932—New York City.

June 3, 1932—Boston, Mass.

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Meeting Southeastern Section, April 30.

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Meeting Piedmont Section, April 23.

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MARCH MEETING, NEW YORK SECTION

The regular meeting of the New York Section of the American Association of Textile Chemists and Colorists convened at eight-fifteen o'clock, Friday evening, March 18, 1932, at the Chemists' Club, 52 East 41st Street, New York City, Robert H. Gaede, Chairman of the Section, presiding.

. . . The routine business of the Section was transacted. . . .

Chairman Gaede: I have been asked to announce that there is an Employment Committee for Chemists and Chemical Engineers located in the Chemists' Club. They have a large number of applicants on their list and they would like to register every man who is now out of work, so that if you know of anyone in that position, please notify him of this. The offices of this Committee are downstairs and they are open on weekdays from ten until twelve and from two-thirty to five p. m. There is no charge of any kind for this service. Mr. Volkman spoke to me about this a little while ago and suggested that I ask anyone who is out of work to register with this Committee, or if you know someone who is out of work that you suggest he register with the Committee.

We have a very interesting program tonight. I am very glad to see two of our older members, who have been with the Association since the beginning, on our program tonight. It is not necessary to introduce either of them, I am sure, nor to go into a lengthy introduction. First I want to present Dr. E. W. Pierce, of the Ciba Company, whose subject is, "The Production of Faster Dyeings on Silk." Dr. Pierce! (Applause)

. . . Dr. Pierce presented his prepared paper. . . . (Applause.)

Proceedings of the American Association of Textile Chemists and Colorists

The Production of Faster Dyeings on Silk*

By **E. W. PIERCE**
Ciba Co.

THE dyeing of silk piece goods falls naturally into two classes, depending on the fact of the silk being either pure-dyed or weighted. The mechanical operations are the same, but in the case of weighted goods care must be taken neither to reduce the weight per yard nor to remove the weighting in irregular patches and thus produce unevenness and clouds. This necessity establishes the general rule that while pure-dye goods may be dyed with the assistance of acids, we must work in neutral or faintly alkaline baths when dealing with tin-weighted pieces, in order to conserve the weighting.

Pure-dye goods may be dyed with acid dyestuffs or with direct cotton dyes, using acids to complete the exhaust, but when we have used acid dyes we may get a perfect exhaust, a clean wash water and the pieces may appear absolutely level and free from clouds, yet after they have come from the dryer they will show a great number of streaked and cloudy effects all over the lot. After much worry and anxiety it was finally discovered that this trouble arose in the dryer; practically none of the dyes used were entirely fast to water and although they would stand rinsing fairly well, they could not resist the action of the water that was left in the pieces after extraction after it had been warmed up by the heat of the dryer itself. This warm water in the goods dissolved some of the dye from the goods and traveled by the rules of capillary attraction to the dried places on the goods and evaporated; a fairly continuous supply of tinted water kept coming to the drier portions of the goods and dried up, leaving a deposit of more color on those portions, which had been irregular in shape on account of the folds in the goods. The final result was that when the piece was examined it showed many irregular patches and clouds and the blame was always put on the dyer. The remedy for this state of affairs is to use only direct cotton dyes or neutral dyeing acid colors in a neutral bath, or else such acid dyes as are perfectly fast to water, such dyes are now obtainable and have in addition an excellent fastness to soaping. While basic dyes were used to a great extent in dyeing silk skeins, they never obtained much favor for pieces and it would seem that the ordinary acid dye is bound, sooner or later to give way to colors that will minimize the difficulties of the dyer, not so much on the dyer's account, but to avoid unnecessary operations and lessen the number of claims for damages.

When we consider the dyeing of tin-weighted silk we note that the majority of piece dyers are in favor of adding from 2 to 5 per cent of ordinary Phosphate of Soda to the dyebath, which insures that the goods will not lose weight during the dyeing operation by having the tin dissolved off the fibers by the boiling bath. Phosphate has a very good effect on the solubility of the average dye and promotes even dyeing, but it is also true that it makes the bath slightly alkaline in reaction and so retards the exhaust. This can only be overcome by a more lengthy boiling, but as too long a time in the dyebath is likely to produce chafe marks on the goods, or even lousiness, it is better to limit the amount of Phosphate to one or two per cent. Most of the direct cotton dyes and the neutral dyeing acid colors will give a good exhaust and prove fast to water and soaping at 120 deg. F. Today the great majority of tin-weighted silk pieces are dyed in this way. The demands for prints, which are generally discharge styles, requires that the ground colors be easily discharged to a pure white and that the ground will not be tinted by a soaping at 160 deg. F. Few of the best direct dyes will stand a soaping at so high a temperature, even if they are after-treated and so we are compelled to use developed dyes. The application of the color is exactly the same as with ordinary direct dyes, the developed dyes being direct dyes which are capable of being developed. After the dyeing operation it is necessary to rinse quite thoroughly to remove any loose color which may be left from an incompletely exhausted bath. The diazotizing and development is done in the same machine without removing the goods, but it is highly important that the rinsing between the operations be as complete as possible. The dyer has at his command a complete range of colors, some of excellent fastness to light, although his principal difficulty is in matching samples as easily as he does in his regular work; a swatch must be cut from time to time, rinsed and diazotized, then developed and dried and compared, in order to note the progress of the dyeing. This is not as difficult as it sounds and few dyers complain of it after they have become used to the operation.

We have available today acid dyes that are of excellent light fastness, together with a good wash fastness, there are direct dyes of exceptional fastness to light and good

* Presented at March Meeting, New York Section.

fastness to washing, there are developed dyes of excellent fastness to washing and good fastness to light, but no one seems to be producing dyeings on silk pieces, either pure-dye or weighted, that have excellent fastness to both light and boiling soap. Such dyeings are to be found on cotton goods in every department store, the dyes are available for silk also, but nobody seems to have taken the trouble to work out a practical method of application, so the public may be given a fabric that will be a great advance over anything that has gone before and so possibly bring back a popularity to silk goods that may be the means of reviving an industry that has lately suffered much. The excuse has always been that the vat dyes would be too expensive; well, if the cotton industry can afford to use them to the extent they now do, then they are not too expensive for such a valuable fabric as silk, particularly when they may mean the saving of the industry itself.

How shall we go about applying vat dyes to silk? The practical methods in use today in cotton dyeing have narrowed down to jig dyeing and to padding, padding being either with the unreduced color or with a reduced bath. The greatest drawback to jig dyeing for all-silk goods is that the strain on the selvages is likely to be too great and the goods may be damaged by tearing. This is a problem we will refer to the machine makers who are even now trying to introduce new types of jigs, such as single beam jigs and jigs with a differential to equalize the speed during the run. There is little doubt that if a jig can be made which will handle delicate silk goods, they can be dyed with vat dyes with no more difficulty than cotton. Of course we are likely to have the best success with the easily reducing Indigoid vat dyes, which require the least amount of caustic in the dyebath. It may also be advisable to adopt the method used in dyeing wool with vat dyes and transpose the caustic soda by the addition of ammonium sulphate. As with cotton dyeing, it is very necessary to keep the rolls in constant motion until the dyeing is oxidized, to avoid any settling of the liquor and formation of bars on the goods. The use of a protective colloid is recommended, not so much as a restrainer but to retard precipitation due to oxidation.

Padding seems to offer greater chances of success. The principal drawback is that padding is best adapted to quantity production, while there is a tendency today for orders to a silk dyehouse to be limited to very small lots. This will not work any great hardship because it has been proven that the best results in padding are to be had when a very small color box is used, so with a small color box and a small stock tank there is no reason why one or two pieces of 60 yards each could not be run with profit. It is necessary to have the caustic and hydrosulphite so adjusted that when the air oxidation has taken place the result will be nearly neutral rather than strongly caustic or alkaline. I refer to padding with a reduced liquor; when the goods have been oxidized by the air, they only need to be washed in warm water and given a boiling soap.

Pigment padding with the unreduced vat dye is simple to the last degree, but the reduction on a jig now introduces the same objections as jig dyeing; these being mechanical, we must look to the machinery makers for a remedy. There is evidently little advantage in pigment padding over jig dyeing, but we must use one or the other when the darker shades are required, because the reduced method is dependent on the quantity of dye that can be dissolved in the relatively strong liquor that must be used. Each dye has its limit of solubility and when we wish to make a medium or deep shade we find that enough dye cannot be dissolved in the liquor to produce a deep shade.

Over a year ago the writer suggested, in connection with cotton padding, a method which would be free from many of the objections of the present methods, which has been commented upon favorably by practical dyers, but which has never been tried out in a practical way by anyone. It is possible this process may be applicable to silk, but its development will require some experimenting and the spoiling of a few yards of goods.

If we take the formula used by a printer for a large blotch of any vat dye and omit most of the gum thickening and simply pad on the goods the mixture of vat dye, hydrosulphite NF (Rongalite), glycerine and carbonate of potash and then dry it and run through the ager and treat it as if it were a print, we should get a level, well penetrated and well covered shade. The use of the rubber nips or squeeze rolls would tend to smooth out the color and diminish specks and small lumps, that might even appear in a print. It may be safely predicted that any dyer or printer who will develop this method will soon have his plant running on full time and all the work he can take care of.

The time is ripe for a new development in silk dyeing. Vat dyes are the logical answer to the present problem of the silk industry, your cooperation is invited, it is sure to be for the ultimate advantage of all concerned.

Discussion

Chairman Gaede: Dr. Pierce has gone into this subject a little bit differently from what we have heard in some time. I am sure he has opened up a new field for thought and I should like to ask if there are any questions that anyone would like to ask Dr. Pierce.

Mr. George L. Baxter: Dr. Pierce, you made the statement that you thought it would be practical to dye as little as 120 yards and come out with a profit. I can't agree with you on that because I think you are limited in the price which any dyer can get for finishing any quantity, and I think your limit will be fourteen or sixteen cents on the average cloth. That would mean, on 120 yards, at the most, $28. I don't see how you can make up a mixture, match a shade, and run it for $28.

Dr. Pierce: Unfortunately, today the dyer is at the

mercy of the man who sends him work to do. It is a crime the prices that dyers are getting for the work they do, when you consider the care they have to take with it and the ability that has to be exercised to produce good work. I cannot adjust that situation for you. That is up to the Silk Association and the dyers, and I think they ought to wake up and make these fellows see that they have got to pay the dyer a reasonable and fair price for the work he does for them. Otherwise, you cannot continue the industry on the present basis.

Mr. Baxter: I might say. in that connection that the thing goes all the way along the line. That is, it goes all the way along, right to the department store. Each cloth, from the department store back, is figured in a certain priced garment. You will find the pressure is so strong all along the line that no one today can do a great deal toward raising prices at their end. The whole picture must be changed before there can be any radical raise.

For your information, my own firm are doing or have done some vat work on silks, tub silks, but the thing is practically dead because you can't find anyone who will pay the price we have to ask in order to "get out" on it.

Mr. Ephraim Freedman: In answer to Mr. Baxter's statement I should like to say that I don't believe that the department store or the public is at fault. I believe the fault rests right here with the dyers and the converters because I have on quite a number of occasions had people come up and say, "Here is a piece of silk that you can buy for so much less than anything else you can get on the market."

Now, what is the answer to that? If converters will offer merchandise at a sacrifice, a man would be foolish to turn it down, and that is what is happening today. It has been happening right along.

I had some merchandise submitted to me just the other day and it was considerably weaker than anything I had seen in a long time. The buyer didn't ask for it. Someone came into the store and offered it to him.

As a matter of fact, I saw some weighted silk the other day that had a tensile strength in the filling of a little over twenty pounds. Compared with another piece of weighted silk, it was considerably superior in that the other piece of silk had a tensile strength of only fourteen and a fraction pounds in the filling direction. But after submitting both specimens to accelerated ageing tests in the Fade-Ometer for a period of twenty-four hours we found that the weighted silk lost from fourteen down to ten pounds while the piece of silk that had a tensile strength of twenty pounds originally dropped down to five pounds.

If merchandise like that is brought into a store and if the store is not equipped to test that merchandise, the fault is not with the store but is with the man who brings those goods into the store. He is creating a demand for that merchandise.

Chairman Gaede: Mr. Freedman certainly seems to have won his point. Are there any questions in connection with his remarks? (Laughter.)

I am sure there are others who would like to ask Dr. Pierce a question or two.

Mr. Freedman: I should like to ask Dr. Pierce a question about the vat dyeing of silk.

Do you believe, Dr. Pierce, that vat dyed silks at the present time will give us as large a variety of colors and as brilliant a color scale as we are now getting with other classes of dyes?

Dr. Pierce: There is no doubt about the brilliancy and range of colors you can get. The problem is entirely a commercial one. Apparently the silk industry has dropped to a point where there is hardly enough profit left in it for anybody. The dyer doesn't get his money back, and you would be surprised to know how little profit the dyestuff manufacturers get from the dyes they sell. It was different in the past but it isn't what it ought to be today.

I should like to see the silk industry pick up. The woolen people have everything their own way at the present moment. Cotton, rayon and silk are down in the "dumps," and we must do something to help the silk industry. It is a big industry in this country. It was for that reason I thought this point might be taken up and lead to a discussion. I thought we might get from it some ideas as to how to awaken the public to the situation.

Mr. Freedman: Well, Dr. Pierce, there again I must take issue with you, because I have had occasion in the past few years, and more particularly within the past two months, to ask for a full range of colors in vat dyed silks and the answer invariably has been, "You cannot get it."

I should like to see a full range of colors in washable silks. That of course would include reds, browns, and blues. In the lingerie type I should like to see the pinks, which frequently give trouble, and some of the greens. The browns and the reds are causing quite a bit of difficulty, and I should like to see some bright shades in the reds.

Dr. Pierce: I see no reason why you can't get them, because they can get those shades in prints, and if someone will have the courage to try that last process I recommended—simply take the formula you would use for a print and instead of having it thickened up with a large amount of British gum or tragacanth or any other thickening, have it very fluid and pad the silk with the same compound that you would use for making the print, and develop it in an ager—he will certainly get as bright a shade as he can get on a print, and there is no lack of brilliancy in the prints that you get with the Indigoid vat dyes.

All I ask is that someone cooperate and see if we can't develop something like that. I think it will be of benefit to everybody.

Mr. Stewart F. Carter: Dr. Pierce, referring to the process you have just spoken of, padding and then putting through the ager, I want to say that in the past I did quite a number of pieces that way. I looked up some of my old record books, and I started running those, mostly for the groundings of shirtings, in 1911. We were running regularly then, and successfully.

Dr. Pierce: Thank you, Mr. Carter.

Mr. C. A. Puller: Dr. Pierce, from my experience in producing fast dyes I wish to make an open statement here: that I have customers in the silk industry who can afford to put seven cents worth of dyestuff per yard on pure dye goods and they still claim that they are making a handsome profit. That shows that if a real fabric is developed and put on the market, the dyer will be able to get his price out of it, if he doesn't weaken. (Laughter.)

Mr. Freedman: Dr. Pierce, I should like to say in substantiation of the remarks of the previous speaker that during the past year we have had a number of dyers visit us and a number of converters, and I am quite sure that those who delivered the goods were paid accordingly.

Mr. A. P. Howes: Mr. Chairman, I don't know anything about this thing technically, but I think that, from a purely commercial standpoint, there is a great deal to be said in favor of Dr. Pierce's suggestion, which apparently is borne out by Mr. Freedman.

I happen to have an interest in an advertising agency which over the past year handled two accounts of an entirely different nature, both of which were suffering from the same sort of thing that is prevalent throughout business today generally, and the silk business in particular. In other words, there was no margin of profit. They had a certain volume of business, but it was being conducted at so low a competitive price level that there was absolutely no money being made.

This agency suggested in both of these cases that these firms go to the opposite extreme, at least on part of their production, that is, instead of trying to meet competitive conditions, that they put out a superior product and price it well above anything on the market, but at a price which would leave them a handsome profit if they were able to sell it. In both cases the results were very satisfactory. On that part of their business on which they went after quality solely they were able to make a sufficient profit to carry the "no profit" or loss end of the competitive business.

I don't know whether, as Dr. Pierce says, a full range of bright colors can be obtained on silks by the vat process but I feel morally certain that if some leading dyers were to put out a line, assuming they can be obtained, even at a considerably enhanced price over competitive prices, there would be enough consumption to justify it, and to make a profit that would help carry the freight on a lot of this competitive stuff.

In times like these I think the thing to do is to get away from attempting to compete on a price basis, and to put out something on a quality standard, on which you can get a margin of profit that is sufficient to make it worthwhile to do the business.

Dr. Pierce: Regarding what Mr. Howes said about the range I think I had better be more explicit. You are all aware that you may get the most brilliant pinks in the series of vat dyes, the pinks of the Carbazol series, like FF and FB, the scarlets of that series, the scarlets in the Indigoid series, the bright blues, the violets. Then we step over to the Anthraquinone series and take Jade Green, which will work very satisfactorily by the same process. We then have a number of browns that are straight products that will give rich golden browns or deep chocolate browns. We have blacks. I think the whole series may be covered very safely. It depends upon the skill of the dyer to produce them. But we cannot match Rhodamine. However, the Pink FF is fairly close, and that little bit of difference would be readily overlooked if we get the extreme fastness of the vat dye.

Another point about putting the vat dyes on silk goods is this: the operation is so quick and so simple that the silk dyer does not have to have any rubbing machines for his satins. They will come through beautiful and clean and brilliant. He won't have chafe marks on his crepes. There will be no mechanical action that will disturb the surface of the goods, requiring special treatment in dressing. He won't have as many damage claims, which is the big bugbear of the silk dyeing industry today.

So think it over. I think you will see that there is something in that idea and it may save the business.

Mr. John D. Huizeng: How will colors match? On vat dyes I understand that they have difficulty in matching shades, and that if the shade is too dark it is very hard to bring it down. And that is very important.

Regarding the brilliancy of colors, we have occasion to use vat dyes and we are always discouraged from using them by being told that we cannot get the brilliancy and we cannot get the match. That is what the dyers tell us.

Dr. Pierce: There is one general rule in connection with vat dyes, and most of you I believe will agree with me on this. In matching a shade with a vat dye, if you can make that shade with one single dyestuff you are fortunate. If you have to do it with two dyes, you may do it with fear and trembling. If you have to use three you are taking greater chances. But it all depends upon the skill of the dyer.

I realize that a job dyer who has to match a great variety of shades as they come in from the customer has a much more serious problem than a mill that attempts

to produce a line of six or seven shades because as you are running you establish a formula and they will come out very close to the standard shade each time. They can be pulled down a little bit but they are not as flexible as the ordinary dyes. We will admit that.

I hate to admit, too, that sometimes dyers are tempted to top them off with other classes of colors, and they get away with it. (Laughter.) But that isn't sanctioned. It isn't ethical. (Laughter.)

Mr. Edward J. Volkman, Jr.: I should like to ask Dr. Pierce a question with regard to his idea of using the printing formula on silk. What would the fastness be to rubbing?

Dr. Pierce: It depends a great deal on the dyestuff you use. Some of the dyes will rub. Frequently they will, and it is very difficult to control the situation. I think I can give you an illustration of that.

There is a certain scarlet that, if you dye it or print it up to its full depth of shade, will not rub but if you try to get a deeper shade by using more of it, it will rub terribly, the reason being this: every vat dye is really a pigment, just as Ultramarine or Prussian Blue is a pigment. It has a maximum color. If you get that much color on the fiber and then try to make the shade deeper by putting on more color, you do not deepen the shade as you would with a soluble dye. The excess color you put on is not fixed and therefore rubs off. You have to choose your dyestuffs and not use an excess of color. Use only as much as will be properly fixed and if it is properly fixed and properly soaped after dyeing it should not rub.

Chairman Gaede: I should like to ask Dr. Pierce one question.

In matching some of the darker shades that Mr. Freedman spoke of—some of the dark browns and some of the dark reds—could you dye them, without rubbing?

Dr. Pierce: You can make dark browns and blacks without rubbing. It all depends on the peculiar characteristics of the dyestuff you are using. Some will rub and others will not. The same is true of Acid and Basic colors. There must be considerable work done in picking out the correct dyes to use. If you do get the correct dyes I think you will have no difficulty.

Mr. W. W. Chase: Dr. Pierce, isn't there a possibility of augmenting the vat dyeing with the Naphthol colors in some shades, such as is done with cotton?

Dr. Pierce: I see no reason why it couldn't be done.

President Wood: Would you have to use too much caustic?

Dr. Pierce: That is a delicate point. I have had no experience in producing Naphthols on silk, but if you keep the temperature low and if you use some protective colloid the danger is greatly lessened. But I really have no practical information on that.

Mr. Puller: Pardon me if I attempt to answer that question on the subject of Naphthols but I have seen several friends of mine produce those on pure dye as well as tin-weighted silk. They dye beautifully on silk, making a uniform and nice, even color. But as far as fastness is concerned they are very weak, no better than a Direct color.

Chairman Gaede: Are there any further questions?

Mr. Springer: I should like to know how the tensile strength of pure dyed silk will compare before and after dyeing with vat colors, after being exposed to light, both as regards dyeing and printing.

Dr. Pierce: I have no exact data on the subject. I do know that there are certain of the vat dyes which in themselves are quite excellent, that have a tendering effect on cotton. I don't know of any research work that has been done on the subject of the vat dyes on silk affecting the tensile strength. There may be some things that will be found out, possibly different dyes than the ones that tender cotton. It may be you will find a few. I cannot tell you now which ones will do it.

Chairman Gaede: I am sure that we could go on indefinitely with the discussion of this paper. However, I think we had better go to our second paper and then if there are any more questions and if there is time to take them up after the discussion of the next paper we will take them up at that time.

Our second paper this evening is, "The Production of Faster Dyeings on Rayon and Cotton Mixed Goods," by "Phil" Stott who I am sure you all know and whom we are awfully glad to have with us tonight. I should like to present Mr. Stott at this time. (Applause.)

Mr. P. Stott: Mr. Chairman and Ex-Fellow Members of the New York Section: As well as I can remember it is about three years since I spoke to this Section, and it was on rather short notice, almost as short as this was. I was rather careful at that time to select a subject that I knew a little bit about. I was reasonably sure that you didn't know much about it so I was rather happy that there wasn't much discussion. I rather expected there wouldn't be, and there wasn't. However, tonight I rather feel that you may know a good deal more about this subject than I do, and I hope that you won't adopt the attitude of getting back at me for the selection of the subject that I made last time I spoke, which I think, was "The Manufacture of Dyestuffs," rather than their application. I hope that you won't capitalize on the fact that I chose a subject of that type and take it out on me tonight.

. . . Mr. Stott then presented his prepared paper. . . . (Applause.)

Proceedings of the American Association of Textile Chemists and Colorists

The Production of Faster Dyeings on Rayon and Cotton Mixed Goods*

By **PHILIP STOTT**
E. I. du Pont de Nemours & Co.

THE phenomenal development of rayon as a popular fiber during the last fifteen years has naturally led to a vast amount of experimentation on the part of producers, converters and suppliers of dyestuffs and chemicals to exploit the possibilities of the comparatively new fiber to the ultimate. Development of production itself is reflected in undoubted greater uniformity of product than existed at the outset; in the development of machinery to make possible the production of novel forms of rayon such as narrow strips for decorative purposes and in the popular sheet form known as Cellophane. Such developments represent a decided forward step from the fine fragile web-like filaments originally produced with great difficulties.

However, this evening we must concern ourselves only with problems which have confronted and which still confront the converter. The dyeing of rayon as a self fiber has presented the converter with a good many troublesome problems. The solution of these has been approached in many ways among which the greater uniformity of the product itself referred to above was a step in the right direction. Increasing knowledge of the dyestuffs involved and their affinity for the fiber under various dyeing conditions has also straightened out many difficulties. This phase has been made the subject of much research work and literature published not only by dyers but also by dyestuff suppliers. Colors selected for their level dyeing properties have been carefully evaluated and emphasized by the manufacturers. In some instances the dyestuff supplier has even developed entirely new lines of colors systematically synthesized to possess constitutionally as many desirable characteristics as possible, based on observations of the behavior of established colors.

As we all know, rayon has extraordinary affinity for most of the substantive colors, especially in dark shades. It is only reasonable that it should have, just as mercerized cotton has greater affinity than grey cotton. Therefore, when we start to consider the question of producing faster dyeings on cotton-rayon mixed goods we have first to consider this difference in the fibers themselves. Here we have a combination of fibers substantially of the same origin, but one of them treated chemically to change its entire structure, appearance and properties generally, and also having its affinity for color tremendously increased and yet unfortunately for everyone concerned it must substantially be dyed with the same class of dyestuffs. There is no question involved of animal and vegetable fibers which permit of the utilization of dyestuffs of entirely different characteristics to obtain desired results of solid shades and fastness. In the production of any reasonably solid shades on rayon-cotton material therefore we must bear in mind that satisfactory results depend a great deal on:

1. The type of material.
2. The depth of shade.
3. Selection of colors from the standpoint of their fastness and also their ability to produce solid effects.
4. Suitable dyeing methods.

These points have been emphasized by all of the many writers on this subject. A very cursory survey of comparatively recent literature reveals an instructive article by William Bennett in *Silk*, February, 1929, in which the writer lists dyestuffs selected for their ability to dye solid shades on unmercerized cotton and viscose. The number capable of producing such solid effects in dark shades is very few; those suitable for light shades are much more numerous. The author also points out the differences obtained by substituting mercerized cotton for grey cotton and stresses the importance of careful color selection. This list is augmented somewhat by Landolt in *The Melliand*, June, 1929, who also brings out certain advantages to be gained by a partial mercerization of the cloth, prior to dyeing, but who also points out difficulties in this process also. In a later issue of the same journal (October, 1929). Dr. C. E. Mullin studies the effect of pH, temperature and salt in dyeing viscose, cotton, and mercerized cotton in the same bath with Direct Blue 2B and Direct Fast Scarlet 8BA. *Melliand Textilberichte*, 1930, p. 616 also contains a short article by Hoz and Bauder advising the use of certain selected direct colors by special methods. These are only a few of the many articles published and are quoted to illustrate the fact that this problem has occupied the attention of color men all over the world.

In view of this mass of published information (and unquestionably it could be supplemented by just as much that has not been published), it seems logical at this point to revert to the title of this paper and ask ourselves in what channels must our investigation for faster colors be directed? The much hackneyed term fastness has always been indefinite of interpretation and used indiscriminately at the slightest provocation. Fortunately for all concerned

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the tendency is away from generalities and a greater understanding of the specific nature and value of the term is now existent. Therefore, we can definitely interpret our desires for faster colors in terms of uses of fabric.

The more important cotton and rayon union fabrics can be grouped as follows:—

1. Ladies' Dress Goods.
2. Draperies and Curtain Materials.
3. Hosiery.
4. Lining Cloth.
5. Pile Fabrics.

Let us now attempt to interpret these fabrics in terms of major fastness requirements considering light, washing and perspiration as the three primary factors involved. Suppose we assign numbers to each in order of their importance so that

0 is not important.
1 is fairly important.
2 is quite important.
3 is very important.

We then arrive at something like this classification

	Light	*Washing*	*Perspiration*
Ladies' Dress Goods..	2	2	1
Draperies, etc.	3	1	0
Hosiery	0	3	2
Lining Cloth	1	0	3
Pile Fabrics (upholstery)	3	0	0

Thus out of five different fabrics we have light fastness as most important in two cases, accompanied in one case by no other requirement and in the other a mild washing requirement. Perspiration fastness predominates in one case together with a measure of light fastness, while washing is primary in the fourth case with perspiration running second. Only in one instance (that of ladies' dress goods) do we find no zero ratings or a combination of all the fastness requirements.

Now with this picture before us we ought to be able to do some selecting of dyestuffs and dyeing methods. We must, however, pause long enough to consider the shades required which will naturally vary from Ecru to Navy Blue and Black. In fact, we will be confronted with this problem on all our various fabrics so it seems reasonable at this point to first give some thought to the various classes of dyestuffs which are available from point of view of fastness requirements and treat as a separate problem the question of dyeing method in relation to shade.

The actual colors themselves fall very easily into the following groups:

1. Direct colors.
2. Developed colors.
3. Sulphur colors.
4. Vat colors.

The direct colors permit of the simplest methods of application and can be sub-divided into groups of those exhibiting better than average fastness to washing, perspiration and light. In some cases the three fastness requirements are common to one color. For example, Pontamine Fast Blue 4GL, Pontamine Fast Orange WS, Pontamine Fast Yellow NN to mention just a few. The developed colors as a class exhibit generally better fastness to washing and perspiration, though not necessarily to light. Sulphur colors are best to washing and perspiration while Vat colors generally offer the most attractive properties of fastness.

Reverting back to our classification of material expressed in terms of fastness we can now propose a tentative schedule for our selection of dyestuffs by interpreting the fastness requirements as color. A classification about as follows seem to be correct:

Ladies' Dress Goods....	Developed Colors Direct Colors of selected general fastness
Draperies	Vat Colors
Hosiery	Developed Colors Sulphur Colors Direct Colors of selected fastness to washing.
Linings	Developed Colors Direct Colors of selected fastness to perspiration
Pile Fabrics	Vat Colors

You will notice that no alternative suggestions to the use of Vat Colors for draperies and pile fabrics have been offered. This has been done deliberately because I want to comment at this stage on the possibilities of their usage.

It is admittedly difficult to dye vat colors on rayon-cotton unions and get a solid shade. It is admittedly more difficult than by the use of direct or developed colors and it is still more difficult in heavy shades. On fabrics with a cotton back and rayon pile it is probably impossible but for drapery material with a cotton warp and rayon filling or even a not too pronounced rayon design it can be done in light and probably even up to medium shades. Owing to the lack of facilities for temperature control and the increased affinity of rayon for color in a comparatively strongly alkaline bath, dark or heavy shades cannot be dyed successfully. The goods should be dyed on the jig being careful to have as little tension as possible and a few vat colors suitable for this type of work are Ponsol Orange 4R Double Paste, Ponsol Pink B Double Paste, Ponsol Red BN Double Paste, Ponsol Blue GD Double Paste, Ponsol Yellow G Double Paste and others.

It appears, therefore, that vat colors have some possibilities, limited it is true by certain restrictions, but worthy nevertheless of consideration and experimentation, which point is particularly emphasized by the relatively long life of draper materials and the like. The color, if

vat dyed, would most probably outlive the fabric and this point is important in goods of this nature.

Failing the use of vat colors for reasons touched on above, the next best class of color to resort to is obviously the fastest to light direct colors. As with all direct colors there are many possibilities of variation in application methods to produce certain effects and I will touch on these later.

First, let us say a word about Sulphur Colors. These generally possess very satisfactory fastness to washing and perspiration, but their application is attended by similar difficulties to those pertaining to vat colors. They must be dyed from an alkaline reduced vat and difficulties of obtaining solid effects are enhanced in anything but light shades. They would, according to our classification, only find possible use in the dyeing of hosiery and here we have two alternatives: Developed Colors and Direct Colors for selected fastness to washing. This brings us to a consideration of these last two possibilities of color selection.

It is a well known fact that the substantive colors offer more possibilities for variation in dyeing method to produce desired effects than any other known class of dyestuff suitable for the dyeing of rayon-cotton material. The variations may be in temperature, mordants and assistants, dyeing time and dyeing volume according to shade, type of fabric and so on. Inasmuch as developed colors—that is to say, those which are diazotized and developed on the fiber—fall into the substantive group, they can be considered at the same time as the direct colors. Let us go back once more to our chart of classification of material in terms of fastness and take up each fabric in turn.

Ladies' Dress Goods

The most important fastness requirements are light and washing but neither is of primary importance. Perspiration is to be considered also. We must also consider that this type of fabric is very often printed so that dischargeable colors are necessary. Obviously, developed colors offer the most attractive possibilities and such dyestuffs as Pontamine Diazo Brown R, Diazo Blue 5GL, Diazo Yellow 2GL, Diazo Orange WD, and Diazo Scarlet A should be most satisfactory. As a secondary choice direct colors of rather better than average fastness could be selected and there are many of these which would be quite satisfactory.

Draperies

Failing the use of vat colors which would be best beyond dispute within limits previously discussed, substantive dyestuffs of maximum light fastness should be employed. For example, Pontamine Fast Yellow NN, Light Orange 2G, Red 8BL, Blue 4GL and so on.

Hosiery

Fastness to washing is of prime importance in hosiery, therefore, in developed colors lies the first choice. Secondarily, selected direct colors are best to use paying some attention to those whose fastness is enhanced by after-treatment with formaldehyde or chrome and acetic acid.

Lining Material

Perspiration and bleeding into white when wet are the chief requirements. Developed Colors again present excellent possibilities with direct colors second selecting a similar line to those used for hosiery work.

Pile Fabrics

There seems to be no possibility for any other class of color than the fastest to light direct colors for this type of fabric. Dyestuffs similar to those mentioned under Draperies are satisfactory.

While it is not within the province of this paper to discuss at any great length methods of application, it may be helpful to bring out a few major points if for no other purpose than to promote a discussion by the members present who have experienced the difficulties of the problem. As stated in the beginning, the literature is full of results of research and practical experience and all one can do is to benefit by such experience and experiment further under one's own conditions.

The effect of highly concentrated dyebaths and high temperatures is naturally to force color onto the more aggressive fiber, rayon. Logically, therefore, lower concentrations and temperatures are indicated as the starting point for union work.

All substantive dyestuffs including the developed group, when used in quantities of four ounces or less per 100 lbs. material, exhibit greater affinity for cotton than for rayon. In quantities between four and twelve ounces the affinity for both fibers is reasonably uniform when applied with proper temperature control. In greater quantities the affinity for rayon is greater than for cotton and the difference increases as the quantity of dyestuff used increases.

Regardless of the quantity of dyestuff used, the affinity for the rayon increases with increased temperature, the maximum affinity being reached between 200 and 212°F.

The addition of salt to assist exhaustion increases the relative quantity of dyestuff absorbed by the rayon compared with that absorbed by the cotton and this difference increases as the quantity of salt used is increased and regardless of temperature variation.

These being generally accepted facts it is obvious that temperatures between 200 and 212°F. assist the uniformity of absorbtion by both fibers when the quantity of dyestuff used is small, whereas medium to full shades are more uniformly absorbed at lower temperatures, 120 to 160°F.

It is unfortunate from all points of view that a more complete range of colors similar to the Stilbene types is not available. These are more uniformly absorbed by cotton and rayon in greater concentration than other substantive dyestuffs and in medium to dark shades can be

advantageously used for filling the cotton. However, they are only available in yellow and orange and do not discharge satisfactorily.

In conclusion, may I once more emphasize the importance of color selection as a means to the end of production of faster colors on rayon-cotton goods, rather than any revolutionary changes in new dyestuffs or application methods. The question of cost which admittedly is a vital one at the present time has not been discussed and it naturally must have some influence on the choice of color and method.

Better quality, however, invariably means higher production cost in any manufacturing project. Those who are willing to sacrifice quality for cost provided that the product merits quality, are courting nothing but embarrassment.

To a large extent color makes a fabric and therefore the color should at least equal the fabric's life.

DISCUSSION

Chairman Gaede: Mr. Stott's paper should certainly start a good discussion. Are there any questions?

Mr. Baxter: Referring to your chart, Dr. Stott, under the first classification, or ladies' dress goods, I would say that if you were to take any standard group of finishers, the actual yardage produced by them today, you would find that the vat color work on cottons (that is what I am speaking of) would probably be very nearly equal to that dyed in both Developed and Selected Directs. That doesn't include mixtures of cotton and rayon which in vat colors are almost a novelty.

Mr. Stott: Yes. Well, I didn't mean to state that vat colors were recommended for ladies' dress goods. Of course, we know that vat colors are used for cotton dress goods, ladies' cotton dress goods. They are mostly all printed nowadays. That is the reason vat colors are used but for dyeing brown shades on cotton and rayon union for ladies' dress goods to the extent that such a fabric is used (which probably isn't very much, compared with tin-weighted silk and pure dye silk, and cotton) vat colors really couldn't be used, as pointed out here because of the difficulty of producing a union, in the first place, and, of course, secondarily, and probably this is even more important, because of the desirability of having goods that can be printed, because the number of solid shades which the ladies are wearing nowadays is comparatively few, as compared with the number of designs. So that it is almost imperative to have dischargeable colors for the grounds.

Mr. Baxter: The number of solid shades today is greater than it has been, (I think Mr. Freedman will bear me out in that) at any time in the last five or six years. And I think Mr. Freedman will also bear me out when I say that the number of cotton and rayon mixtures today is not so great and they are very much in disrepute. Am I right? (Laughter.)

Mr. Freedman: I don't think you want an answer to that. (Laughter.)

I will say that so far as draperies are concerned, I feel that rayon and cotton drapes should be washable. They are rather inexpensive and housewives do not as a rule send them to the dry cleaners. They should be capable of a greater degree of fastness than that accorded them on the chart.

In so far as cotton and rayon ladies' dress goods are concerned, since dresses of that type are worn principally in the summer when the weather is rather warm and the amount of clothes worn is rather scant, the proximity of the clothes to the body would indicate a greater fastness for perspiration. In fact, I should judge that the fastness to perspiration should be equivalent to the washing fastness.

Mr. Stott: Well, of course, you would have that if you used Developed colors. And as far as the fastness to washing of draperies is concerned, of course, the chart shows vat colors but as I explained there are limits on account of the shades. A good many draperies are dyed in Ecru, and colors like that, particularly the net draperies that are so much in demand nowadays, and there isn't any particular difficulty about dyeing shades of that kind with vat colors, that is, as far as the union is concerned. There may be mechanical difficulties but as far as the union is concerned there are no particular difficulties. So that in case you did want light fastness and washing fastness for draperies of the maximum degree in shades of this kind, there is no reason why you shouldn't use vat colors. But, of course, if you get onto something like this (indicating a dark brown) then it is almost impossible to get a union between the cotton and the rayon and you have to use Selected Direct colors and, of course, if you must have greater fastness to washing it is comparatively easy to step this up by color selection.

I merely classified this, of course, as just having a measure of fastness to washing. In any specialized case where the fastness to washing requirement steps above this comparative figure here, I think you could solve the problem with Direct colors.

Mr. Chase: There is one thing that I want to point out, aside from the same question that I asked Dr. Pierce —why not augment that with Naphthols?—and that is in this case of dyeing cotton rayon unions, getting the same shade, it is my impression of every test that has been made that the time element has not been taken into consideration and that you would get entirely different results in some types of dyeing than in others; and dyes that ordinarily are considered not to give good unions on cotton rayon, if dyed by methods which in some cases ran very much faster than jig dyeing for instance, would give a very much better union.

I think there is opportunity for a great deal of work

along that line, taking the time factor into consideration.

Mr. Stott: Well, that of course is quite true probably. The more concentrated the dye bath, the less the chances are of getting a union between the two fibers. And that concentration refers not only to concentration of dyestuff but also to a concentration of mordant. In other words, you can take any direct color, say Blue 4GL, for instance, which does dye quite a good union between the two fibers in light to medium shades, with proper temperature control, and without the use of very much solvent in the dyebath. If you dye Blue 4GL and enter the goods into a boiling bath which contains, let us say, twenty per cent of salt on the weight of the material, you are instantly going to crowd all the color onto the rayon and leave the cotton comparatively unstained. Of course, there will be color on it but it will be comparatively unstained. And the longer you dye that, of course, the worse it is going to be. However, it is conceivable, that you could start at a fairly high temperature without salting the bath, and with possibly the use of some soap, and allow your goods to dye in a cooling bath for a comparatively short length of time, and balance the union.

These are methods that have been tried out by, as I said in the paper, a great many dyers and dyestuff houses that have done a tremendous amount of work, and of course each dyer probably has his own ideas of color selection as well as method. But from the standpoint of actual time element, it is important, of course. There is no question about that.

Just as a matter of information, before I came up here I actually tried to pad some vat colors on some cotton alpaca cloth, cotton rayon alpaca cloth, and while of course it was only done in a laboratory way there was all the speed that you would want, nautrally, on a dyeing of that type. The dyeings were subsequently re-reduced to imitate more or less a continuous machine and the unions were surprisingly good.

So, of course, there is a question of time involved there, too, and a similar method, if it could be perfected mechanically for this type of cloth, which is more or less fragile, would undoubtedly produce a better union. In other words, a padding method would produce a better union, I feel sure, than a time dyeing, say, in the jig, because your goods are in contact for such a short length of time with the dyestuff solution that the rayon really hasn't the opportunity to take the color to the same extent as it has when it is dyed in the jig.

Does that answer your question?

Mr. Chase: That is exactly what I had in mind: that nowhere near enough attention has been given to pad dyeing these unions. People have too often considered jig dyeing as the criterion and for that reason they have neglected the pad dyeing, and with the pad dyeing, if the size of the box was arranged properly so that you would get the optimum time of immersion you would get much better unions than in jig or reel machine dyeing, in many instances.

Mr. Stott: I am very glad that you brought that point up because I haven't had any practical experience in pad dyeing of cotton and rayon goods, with any kind of colors, as far as that goes. And, of course, when you mention vat colors from a reduced vat, dyed on the pad, on cotton and rayon, why, people are very much apt, like they did on the matter of dyeing silk with vat colors, to throw up their hands and say, "It is impossible."

Well, I don't think anything is impossible if you have the courage to try it. It may mean that you will ruin some yardage of cloth before getting results, but there is no question that it is a logical procedure.

Mr. Chase: Oh, it is possible. It has been done on thousands of yards commercially, without any danger at all.

Mr. Freedman: Mr. Stott, I see that hosiery here is at the bottom of the table, and of course hosiery is at the bottom of our feet. (Laughter.)

Not so long ago we had occasion to examine some seventy-six pairs of rayon and cotton hose, men's hose, gathered from about town, ranging in price from eighteen to fifty cents a pair at retail. I am going to refer to the washability and perspiration tests.

All of the hose were washable in so far as resistance to fading is concerned, but all of the hose stained. So that if they were washed with hose of lighter colors, or with other materials, staining would take place, and in most cases the staining was noticeable.

In so far as perspiration is concerned, I don't believe more than thirty-three per cent of the hose examined passed the perspiration test, that is, with the normal perspiration solutions made according to our formula.

Mr. Stott: That isn't difficult to understand.

If the stockings were dyed with Direct colors, in navies, blues, and nigger browns and blacks, and things of that kind, of course, when you washed them—and I presume you washed them at about wrist temperature or a little more than that—

Mr. Freedman: Wrist temperature.

Mr. Stott: It is quite conceivable that some of the color would bleed off. That is why for hosiery we have the alternative of using Developed colors which naturally will improve the fastness to washing. Of course, I don't know whether these hose that you have reference to were dark colors or whether they were light colors.

Mr. Freedman: They were mostly dark colors.

Mr. Stott: Then it is only reasonable to expect that the direct colors will bleed. It might not come down in strength because, after all, the amount that will bleed off in proportion to the amount of color that is actually on the hose is very small, but in relation to the amount of white hose which is washed, which is colorless, it ob-

viously would show up as a stain, and most probably those hose were dyed with Direct colors.

Mr. Freedman: The point I am trying to bring out is that the market does not at the present time seem to carry or afford any colors in men's hosiery which do not stain upon washing. There seems to be a field for that.

Mr. Stott: I don't know just what the cost of dyestuff is in relation to cost of manufacturing, cost of the actual hosiery, but it must necessarily be quite small. The question arises then, if you want faster dyeings you have to pay for them. It doesn't make any difference whether it is hosiery, draperies, or what it is, if you want fast dyeings you have to pay for them. It is the same question that Dr. Pierce brought out: that if there is a market for fast dyed silks, in other words, that will merit the cost of dyeing with vat colors, to restore some of the confidence in the silk industry that has been lost—the same argument applies of course to any textile fabric—if the mechanical part of it can be successfully solved, there is absolutely no difficulty about getting the dyestuffs.

To take up the question of black hosiery, for instance, before the ladies deserted the dark colored hose some years ago there was sold in this country enormous quantities of Developed Black to hosiery manufacturers, and it is the despair of every dyestuff salesman that the hosiery mill that used to use six or seven or eight thousand pounds of Developed Black a month doesn't use more than a very, very optimistic estimate, four hundred pounds now, simply because of that lack of demand. If they use four hundred pounds a month now, it is a great deal.

The dyestuff is there, because in connection with the black hose that the ladies used to wear practically nothing else but, we never had any particular complaints about fastness to washing. At least, I never heard of any.

Mr. Freedman: They were not rayon and cotton, were they?

Mr. Stott: No, silk and cotton; but the same dyestuff can be used for rayon and cotton as was used for silk and cotton. That particular dyestuff is Zambesi Black. Everyone knows what it is, and it is very fast to washing. It certainly will stand washing at wrist temperature without staining white, if it is properly dyed.

So I say it is just a question of whether the goods are able to pay the freight and whether the public is willing to pay a little bit higher price to avoid having their stockings bleed.

Mr. Freedman: The situation seems to be somewhat paradoxial because silk hose selling at fifty cents, a good deal of it, is superior so far as washing is concerned to the cotton and rayon mixtures.

Mr. Stott: Maybe it is a matter of psychology then. Possibly the dyer feels that he is operating with silk which is a more valuable fabric than cotton and therefore puts a better dyestuff on. But that is no reason why he shouldn't put it on cotton rayon.

Mr. Huizeng: Regarding making rayon perspiration proof, can that be made as fast to perspiration as silk? We do a good deal of that and pay top prices for it, but we have a good many claims on account of rayon not being perspiration-proof, and I was told only today that there is no such thing on rayon.

Mr. Stott: I take issue with that immediately because after all is said and done that is not strictly so.

What type of rayon are you referring to, all rayon fabric?

Mr. Huizeng: All rayon.

Mr. Stott: If you want maximum fastness to perspiration, all you have to do is dye it with vat colors.

Mr. Huizeng: Will that make it perspiration proof?

Mr. Stott: It would be perspiration proof if it were dyed with vat colors, absolutely.

Mr. Huizeng: The point comes up then that we can't get the shades.

Mr. Stott: I should like to see any shade on rayon that I can't match with vat colors.

Mr. Huizeng: Maybe. (Laughter.) The dyers can't do it. (Laughter.) You will have to go into the dyeing business.

Mr. Stott: No. Just to refer to that point again, I think there are a lot of people in the textile business—I don't mean in the manufacturing textile business because surely they are informed—a lot of middlemen who have, as I stated in the paper, some very fanciful notions about fastness. They know practically nothing about dyestuff chemistry. It is their own fault because there is plenty of publicity given to it and if they would get in touch and keep in touch with an organization of this kind they could probably learn more than they ever thought existed about dyestuffs, and that is really one of the functions of this Association; that is, to inform the uninformed public about the possibilities of textile application of dyestuffs, the manufacture of textiles themselves, to help the man who is just simply picking goods from here and turning them over to there (indicating), who doesn't know what he is turning over, except that he buys it for four cents and sells it for four and a half. That is all he cares about and if he had the knowledge which is available to him for the asking there wouldn't be nearly so many wild stories about colors not being fast to this and not being fast to that because with the present development of dyestuffs in the textile industry—I am going to make a pretty broad statement now—it is almost impossible for any converter not to produce dyed goods of satisfactory fastness, provided he knows beforehand what that fastness is and provided that it doesn't present some insurmountable mechanical difficulty.

What I mean to say is that so far as the availability of the dyestuff and the knowledge of application of the

dyestuff are concerned, there isn't really anything to be learned. There is probably a good deal to be learned from the standpoint of application to different fibers, in order to produce certain effects. I will grant that. But, believe me, there is a great deal more to be learned by the middleman who constantly brings up these points and doesn't know what he is talking about.

Mr. Huizeng: With further reference to the matter of perspiration, don't you think that that may depend upon the individual wearing the cloth, the acid in the individual person?

Mr. Stott: Naturally, that varies. I grant that. There is no question about that. But I can answer that point by just simply referring to the official fastness tests of this Association, which call for fastness to acid and alkaline perspiration, and if in selection of colors you specify that the colors that this garment shall be dyed with shall meet the fastness to acid and alkaline perspiration requirements of the American Association of Textile Chemists and Colorists' test, you have something definite and positive to which to tie it. (Applause.)

***Mr. Chase*: There is one more thing that I should like to add.** It isn't a question. It is an assertion, and that is that there is a lot of tommyrot about matching of shades. There is absolutely no reason why so many shades should be called for and why people should be asked to give such close matches.

For example, Dr. Pierce spoke about the ease of dyeing a shade with one vat color. He said that when you have to use two vat colors there is more difficulty; and that when you have to make a mixture of three it is some job.

Some years ago, one of the largest cotton finishing plants was doing a great deal of vat shirting, and in blue shades some customers wanted a blue that was a little bit on the pink side, others wanted it a little bit on the green side, some wanted it black, some green, some yellow, and everything else. Finally, the dyer decided that what the customer wanted was straight Indanthrene Blue GCD and for three months no matter what shade was ordered the customer got straight Indanthrene Blue GCD, and there wasn't one complaint.

Mr. Baxter: I happened to call on a lot of these customers that Mr. Chase speaks of, and I wish we could get by with that. (Laughter.) As a matter of fact, there is this condition existing today: that one or two of the larger shirt organizations have adopted a certain shade which can be produced by a straight dyestuff, knowing the whole story connected with it, and they are running that so as to help them in getting less variation from lot to lot, and in the individual lots. But so far as getting the general trade to accept that is concerned, it can't be done. There are too many of them that want their individual colors. They want something a little different from someone else. Perhaps they are asking a half cent or a cent more a yard for their range of shades, which is a little different, and you cannot get them all to adopt straight dyestuffs. It seems absolutely impossible. I have tried it with quite a few of them myself and I know the picture that is presented when you try to convince a man that he can take a certain range of straight individual dyestuffs and adopt that as his range of colors.

Mr. Stott: I don't know that that calls for any particular reply but, of course, it would be ideal from everybody's standpoint if every converter would use a straight dyestuff. I mean it would certainly save the dyestuff people a lot of trouble, and it would save the dyers a lot of trouble. But after all, Mr. Baxter, if you want to produce certain shades which may be just a little bit different from the other fellow's, isn't it very much like producing an automobile that has an extra gadget on? In other words, doesn't that help sell the goods? And if it does, isn't that why we have dyers?

Mr. Baxter: Absolutely. You are right.

Chairman Gaede: Are there any further questions? Has anyone thought up any questions he would like to ask Dr. Pierce?

Mr. Louis S. Zisman: Might I ask a question that bears on Dr. Pierce's subject?

What difficulties are involved, do you think, in unionizing cotton and silk with vats? I know it can be done but I thought you might know of certain experiments made on that basis. I mean' how practical do you think it might be or what interest might it be?

Dr. Pierce: It would be quite a delicate operation because the alkalinity of the bath will bear a great deal of weight. The more alkalinity you have, the more favorable will be the condition for dyeing the cotton and the more dangerous it will be for the silk. We want to get perfect results on silk. We may reduce our vat dye with caustic and hydro. Then we like to replace that in great part with ammonia by adding ammonium sulphate or something like that. That condition is not favorable for the cotton. It is more favorable for the silk.

Frankly, I have never tried dyeing the two together.

Mr. Zisman: Aren't there any types of dyes that would offer a happy medium?

Dr. Pierce: They all have the same general properties in that respect, and I would say that the conditions of the dyebath that would favor the cotton would not be as favorable for the silk.

When we have cotton and rayon we have another story. I didn't intend to cut in on these arguments, but I want to cite a personal experience I had in making shades on cotton and rayon draper fabrics. We found that if we padded them in a reduced bath we got almost a solid shade; there was no difference between the cotton and the rayon. But, in the method I used for padding them, I didn't give them a re-reduction. I used an ingredient in the reduced dyebath that would facilitate the absorption of the dye a little more and then simply oxidize

them in the air, washed them with warm water, and soaped them, and got a perfectly solid shade. I feel that if I had re-reduced them and loosened some of that color, much of it would have gravitated toward the rayon and given me a heavier shade on the rayon than it did on the cotton, but in a padding operation you are more likely to get a solid shade than if the dyestuff has a chance to circulate freely in the bath and go toward the fiber for which it has the greatest affinity.

There is no method of padding stockings. The mechanical difficulties are too great. You possibly could get away with it if you could do that. It might be worth trying.

Mr. Stott: I might suggest to Mr. Zisman, if he is interested in dyeing hosiery with vat colors, if he wants to dye a blue, he might take Sulfanthrene Blue 2B and dye it on silk and cotton. Of course, most of the color will go on the silk on account of the constitution of the color. However, just as a basis of experiment, and of course this is purely an experiment I suggest, you could take a color like Blue GCD, for instance, and dye it in the same bath as the Sulfanthrene Blue 2B. The Blue GCD has practically no affinity for silk and has a big affinity for cotton. Possibly by using the two dyestuffs together you might be able to create a union. The same thing is true of Yellow G which has practically no affinity for silk. On the other hand a color similar to Sulfanthrene Yellow R has quite a good affinity for silk and less for cotton. You might be able to arrive at a balance between the two fibers by mixing two different types of dyestuffs, in other words, an Anthraquinone and an Indigoid.

Chairman Gaede: Are there any further questions?

Mr. Carter: I should like to refer for a moment to the matter of fastness to light which, of course, our Society has done a good deal on. There is one thing I have noticed that enters into that and that is that at times the finish has an effect on the fastness to light.

Some time back a Scotch works had an interesting experience along that line. They had some draperies to dye, cotton draperies, and they picked out what at that time were the best colors to use—colors of the GL class. They picked out colors which stood their light test, which was twenty-one days' exposure outside.

They dyed the goods and finished them, and they got back samples which had faded. Well, they took a sample straight from the dyebath and dried it and a sample straight from the finishing process and exposed them in the same way. The one which was unfinished stood up all right. The finished one faded badly.

Then they began to examine the finish. They tried individually the different constituents of the finish, starch, dextrine, and so on, and there was no change. The one with the softener alone faded badly. Then they went on with some other softeners and tried further experiments and they came to the conclusion that the fading that took place was due to the particular softener which had been used.

That is an important thing both for the dyer and for the color manufacturer. The color manufacturer supplies a color which is fast to light. The dyer dyes it all right, and it may be harmed by the constituents in the finish, I mean the class of softener which is used.

I thought that our Committee on Fastness to Light might do well to investigate that a little bit more because it is a trap. I don't know whether Dr. Pierce or Mr. Stott have ever come across that but in the course of my work I have had some troubles which I found were due to this same thing.

Mr. Stott: It is quite possible that a thing like that could happen, depending, of course, on the chemical constitution of the particular softener. If there were anything in there that would set up a partial reduction on the part of the dyestuff it would naturally fade a great deal faster. I don't recall whether you are talking of vat dyes at all but we will use that as an instance.

Mr. Carter: In this particular case, when the trials were made there were some vat colors, and some of those showed some fading, of course, but not as bad as the others.

Mr. Stott: It is easy to understand that if the softener will set up a partial reducing action, the leuco compound of the dyestuff would decompose in the sunlight and would give the effect of fading. You mentioned dextrine as a finish. Dextrine—

Mr. Carter: That will protect.

Mr. Stott: No, dextrine will reduce dyestuffs. You can reduce dyestuffs with dextrine.

Mr. Carter: In their trials, dextrine didn't show that, and among the softeners used the one that affected least was ammonia stearate or some other stearate. But it is quite a question, and it is one that is well worth investigating.

Dr. Pierce: I think I can give you a line on that. If you want to investigate it I think you will find something right away. If you will reduce with cottonseed oil, which is a semi-drying oil, or linseed oil which is a strongly drying oil, just put a little strip across any dyed goods, when that oil oxidizes it will take up enough oxygen to reduce the dyestuff and it will knock out almost any dye you put it on but if the manufacturers of the finish use cottonseed oil in their finish you are almost sure to injure the colors.

Go further back to the oil soluble colors. Most of them have to be dissolved in benzol or kerosene, or gasoline, but if you put turpentine, linseed oil, Chinese wood oil, or anything like that in, they will decolorize in from fifteen minutes to half an hour. It will reduce them completely.

Another thing that will knock out any dyestuff that

can be discharged is the putrefaction of albuminous substances. I have seen silk throwsters put in a batch to soak, leave it in all night, and the next morning when the silk gum had turned rancid the color was completely discharged, just as if hydrosulphite had been put in.

So you have all those conditions working. They are very easily understood and I don't think there is any doubt but what they will happen.

Mr. Carter: Olive oil preparations were used and they seemed to show up very well.

Dr. Pierce: That is not a drying oil.

Chairman Gaede: If there are no further questions I should like to ask Mr. Freedman, our Program Chairman, to make an announcement regarding our next meeting.

. . . Announcement by Mr. Freedman. . . .

Chairman Gaede: I am glad so many of you turned out this evening, turned out to hear our friends, Dr. Pierce and Phil Stott, and I should like to ask for a rising vote of thanks.

. . . A rising vote of thanks was extended to the speakers of the evening. . . .

Chairman Gaede: If there is nothing further the meeting is adjourned.

. . . The meeting adjourned at ten o'clock. . . .

Application of Vat Colors in a Pressure Dyeing Machine*

By DEXTER KNEELAND
Bates Manufacturing Co.

I HESITATED for some time before accepting Mr. Moorehouse's invitation to read a paper here to-night, but finally decided to do so for two reasons; namely, that I believe all active members of the Association should not dodge the issue when called upon, and that a few papers from fellows actually controlling production might benefit in some small measure other members of the Association. I know that I have been able to find something of value in practically every article, pertaining to my work, which is dyeing in the wound form in Franklin machines.

I have made several references to temperatures and amounts of materials used in the article to follow, so that one may check with one's own procedure, probably to say in many cases that the speaker was all wet, but at the same time causes one to investigate to see if there were any good points in the discussion. The remarks pertain only to vat colors, altho we have dyed all types at some time or other; just now vats and naphthols are all that we are using in our machines. The first consideration in package dyeing is the package to be dyed. The condition of the package as it arrives at the dyehouse has considerable bearing upon the results obtained while coloring. In fact, we believe that the package is responsible for the greater part of the success in dyeing.

Of course the man in charge of winding will be willing to accept all credit allowed him, but try to make him accept any of the discredit.

There are various things to be considered as regards the package to be dyed, some of the more important being twist, density, wind, size and moisture content.

Twist is very important, in our opinion. When one goes beyond 4½ times the square, we have found it much more difficult to get generally good results. When dyeing yarns made with higher twist than 4½ the packages will come out of the machine very hard, and very often the packages that were somewhat harder when they were put in the machine will not be dyed evenly. The wind which we have found most satisfactory for single yarn requires 2 turns to traverse a 6" package, this produces a fairly open wind.

We are using a little more open wind for 2 ply yarns, and find that it works quite satisfactorily—1¼ turns to traverse a 6" package. Moisture content will come up later in the article.

The density of the package is very important. If one grasps a package with both hands, it should be possible to press thumbs into package quite readily. The diam-

* Presented at March Meeting, Northern New England Section.

eter of the package is without doubt a matter that might involve considerable discussion. We have dyed successfully packages of 5" in diameter and weighing approximately 1¾ lb. net, not with all colors or all depths, but for several numbers. We have standardized on the 4¾" diameter package for coarse yarn, i.e., from 10's to 30's, and on the 4¼" diameter package from 40's to 80's. Our packages are all 6" in length, although there are a good many 3" packages being dyed elsewhere. We understand the 3" package is being recommended by the manufacturers for use in dyeing 40's single yarn or finer counts. We have dyed the 3" package for other mills, but for our own work we have not seen the advantage in this size package. The 3" package shells off more readily, is harder to handle, and for the equivalent weight of yarn as compared with the 6" package requires double the time in manipulating. The 3" package also requires more dryer space for an equal weight of yarn.

Production in the winding, warping and quilling rooms will be decreased when using the above size package. One should insist on square end packages and consider themselves lucky if they are able to get them.

The square end package, in our opinion, is the best insurance against the appearance of dark rings at the ends, and also if there are any particles of insoluble matter they will tend to be distributed thruout the exposed surfaces, instead of being trapped between the ends of the packages.

There are a few colors that we find it convenient to dye on a package of 3½" in diameter, for example, Vat Black and some very light colors made from combinations that are more or less easily stripped.

The preparation of the yarn before dyeing is still a subject of considerable argument. Probably very few dyers use the same preparation. We have found that a 15 to 20 minute boil using hydrogen peroxide, caustic soda and silicate (4 lbs. of the peroxide, 2 lbs. silicate and 4 lbs. caustic soda to a 500 lb. machine) to be quite satisfactory for our work. We have also used a castor-pine oil and soda ash boil, but believe the former to be the best. The peroxide boil gives a fairly good half-bleach. The next step is to make up the dye, usually in one barrel, sometimes two or three if necessary, in order to be able to strain through cheese cloth. Some dyes, for example the indanthrene browns, are strained through a thin layer of bleached cotton, this takes out practically all of the blackish grit that seems to be in all browns of this type. The bath is sharpened, as usual, with a little caustic soda and hydrosulphite, plus 1 to 2% of a penetrating agent, and glue when necessary, at the dyeing temperature. The dye is added in one portion, except in a few cases, such as for vat black or hydron blues, circulation is commenced usually ½ minute on the outside, 1 minute on the inside, repeated four times, then run for ½ to 1 hour—½ as long on the outside as the inside. When the dyeing is completed the machine is drained, some of the darker colors are given a hydrosulphite rinse, the majority are immediately given a run in warm perborate, then soaped and washed with a softening agent added to the last wash in the case of fine yarns.

We have charts for determining amounts of caustic soda and hydrosulphite necessary for the dyeing and use as checks. Clayton yellow paper with a pH of between 11.5 and 12.5 and yellow G paper to check the hydrosulfite content. Very seldom any additions of caustic or hydrosulfite are necessary unless the dyeing is run over one hour.

When dyeing vat black or hydron blues the yarn is given the usual prepare, and the machine is then filled with water at 175°F for black or 160°F for the hydron blues. One-quarter of the hydrosulfite and caustic soda are put in the machine and one-quarter of the dye previously mixed with hot water. The first portion is run 17 minutes and the operation is repeated four times. The blues are given a hydrosulfite rinse at the end of the dyeing, then warm perborate, soaped and washed as usual. The vat black is given a hydrosulfite rinse, perborate, washed, and is then diazotized with 7% sulfuric acid and 4¼% sodium nitrite, calculated on the weight of the yarn for ½ hour, washed and finished in regular manner.

We have found that the real light colors and very dark colors are the most troublesome. Light colors that may be obtained using dyes that will not strip readily are not very difficult. Our procedure here is to dye the yarn to sample and then drop the liquor, add fresh amounts of caustic soda and hydrosulfite and run about ½ hour at slightly lower temperature than necessary to dissolve the dye. One must be sure that the machine is absolutely clean and that there are no colored cops to give trouble, otherwise this procedure could well prove to be disastrous.

The very dark colors are difficult to obtain minus the dark rings at the ends of the package and with minimum amount of smutting. We believe that proper care in making up the dye in such a volume so that it will strain readily, plus proper balance of alkali and hydrosulfite will produce satisfactory results in the matter of very dark colors.

The following are a few typical formulae: For warm dyeing anthraquinones, ounces per gallon being the unit in all cases and the dyestuff in double paste.

Indanthrene Blue GCD type, ⅛ oz. per gal. will require in the bath .45 oz. per gallon of caustic soda, and .206 oz. per gallon of hydrosulfite powder, ¼ oz. per gallon of the same dye .55 oz. of caustic soda and .206 oz. of hydrosulfite. ½ oz. of dye will require .6 oz. of caustic soda and .3 oz. of hydrosulfite; ¾ oz. of dye will require .68 oz. of caustic soda and .41 oz. of hydrosulfite.

For cold dyeing colors, for example Ind. Brown G type, the following amounts will produce good results:

⅛ oz. of Ind. Brown G double paste per gallon will

require .15 oz. per gallon of caustic and .18 oz. per gallon of hydrosulfite powder;

¼ of the dye, .2 oz. of caustic, .2 oz. of hydrosulfite.

½ of the dye, .25 oz. caustic, .25 oz. of hydrosulphite.

¾ of the dye, .4 oz. of caustic, .35 oz. of hydrosulfite.

1.6 oz. of the dye, .55 oz. of caustic, .41 oz. of hydrosulfite.

We do not always stick to the above figures, for in a few instances a slightly different balance will produce superior results, but for the most part the amounts mentioned above are quite reliable. One should stick as closely as possible to dyes having the same exhaustion rate when used in combination. We believe that one can run into more trouble in this respect in package dyeing than in any other form of dyeing. One cannot be too alert as to the condition of the machines used for dyeing. There should be good sets of pressure gauges on all machines. We have had considerable difficulty in having gauges last very long, but are still experimenting in this direction.

We have found that ten pounds of pressure will give very satisfactory results. Pressure gauges will indicate to some extent whether there is a leak inside the machine, whereby some of the liquor is being returned to one side without traveling in the direction that it should. If the 3 way valve becomes worn this will cause trouble. Pumps must be watched carefully, so that there will be no air sucked in thru faulty stuffing boxes.

We use the old style covers for holding the packages in place, and these must be examined quite often for worn clips and also for signs of too much wear, as they may fit too loosely against the spindles.

In order to have the packages come out clean one must dye certain colors after certain other colors, clean machines quite often with caustic soda and hydrosulfite, and also use a good many paper discs. The paper discs should be removed from the bottom quite often, as the pulverized paper is quite troublesome. One cannot be too painstaking in educating the help in the handling of packages from a standpoint of cleanliness and protection of the yarn. Any sharp edge that a package may come in contact with should be eliminated, for as we all know, knots in the warp are troublesome, and piecing up of ends in the warping room means loss of time and production. Drying of Franklin packages is something that requires considerable attention.

One may have perfect dyeing, but improper drying will ruin the whole thing from a manufacturing standpoint. We have found that a specified time for extracting the packages after they come out of the machine is quite beneficial. We have clocks equipped with charts for each extractor, in order to check the length of time extractors are run. Our dryers are all the Grinnell type with wire meshed trays, and each dryer is equipped with a temperatue regulator and chart for recording the temperature. We try to dry the yarn until it contains about 6% of moisture. Our procedure here is to take 6 average packages from each lot, mark them with strings, and after they are extracted two are put in the top shelf, two in the middle and two in the bottom shelf. When these packages, weighed collectively, show approximately 6% of moisture the lot is considered all right for warping or for filling. If the yarn is dyed correctly and dryed carefully to a certain moisture content, one will never have a complaint as to running qualities of the dyed yarns.

Gentlemen I thank you.

Discussion

Ques. I would like to ask if it would make much difference which way one started the circulation, from the outside in or from the inside out?

Ans. That is something that is difficult to tell; we have operated the machines both ways. We have come to the conclusion that starting the circulation of the dyestuff on the outside is better, just a half minute on the outside, then a minute on the side, repeating this procedure for the first six minutes.

Ques. I'd like to ask how heavy a vat black have you dyed?

Ans. We have used 30% of the double paste.

Ques. Do you get a black that doesn't crock?

Ans. The black will crock slightly, but not enough to produce any trouble in this respect in the finished goods.

Ques. Do you use the powder or the paste?

Ans. We use the double paste.

Ques. Do you have any difficulty in holding your vat black bath?

Ans. We have no difficulty in this respect. We use for a vat black, 250 to 300 lbs. of yarn in a 500 lb. machine, 40 lbs. of caustic soda and 32 lbs. of hydrosulfite powder. We very seldom find it necessary to make any additions of caustic soda or hydrosulfite to the bath.

SEVENTY-NINTH COUNCIL MEETING

The Seventy-ninth Council Meeting of the American Association of Textile Chemists and Colorists was held at the Providence Biltmore Hotel, Providence, R. I. March 11, 1932 at 2:00 P. M.

The following were present:

President: P. J. Wood; Vice President: Wm. H. Cady; Treasurer: H. R. Davies; Councillors: Wm. R. Moorhouse, Ralph F. Culver, Hugh Christison; Councillors ex-officio: Heyward F. Lawton, Chairman, R. I. Section; Prof. L. A. Olney, Chairman, Research Committee. Secretary: A. Newton Graves.

The report of the last meeting was read and approved. The Assistant Secretary's balance sheet was read as follows and approved:

Asst. Secretary's Balance Sheet—March 9, 1932

Cash on Hand January 20, 1932	$ 593.33
Receipts Jan. 20, to March 9, 1932 Incl.:	
Applications—24 @ $2.50	60.00
Applications—30 @ $5.00	150.00
Arrears—2 @ $2.50	5.00
1932 Student dues—1 @ $2.50	2.50
Year Book Sales—2 @ $3.00	6.00
Year Book Sales—1 @ $2.00	2.00
Miscellaneous Reporters	1.60
Howes Publishing Co.—Reporters	8.25
Light Fastness Reports—2 @ $1.25	2.50
Pins—2 @ $1.50	3.00
1932 Dues—77 @ $5.00	385.00
1932 Corporate Dues	25.00
	$1244.18
Disbursements:	
February 26, 1932—Exchange charge	$ .25
March 8, 1932 to Treasurer—Research Fund	25.00
March 8, 1932 To Treasurer—General Fund	1000.00
Cash on Hand—Andover National Bank	213.93
Cash on Hand	5.00
	$1244.18

Treasurer's Report—March 10, 1932

General Fund

Cash on Hand Dec. 3, 1931	$6268.65	
Receipts Dec. 3, 1931 to Mar. 10, 1932	2800.00	
	$9068.65	
Expenditures Dec. 3, 1931 to Mar. 10, 1932	972.57	
Balance		$8096.08

Research Fund

Cash on Hand Dec. 3, 1931	$2317.23	
Receipts Dec. 3, 1931 to Mar. 10, 1932	2725.00	
	$5042.23	
Expenditures Dec. 3, 1931 to Mar. 10 1932	2145.60	
Balance		$2896.63

Bank Balance

General Fund	$8096.08	
Research Fund	2896.63	
Balance		$10992.71
First National Bank Checking Acct.	$5046.22	
First National Bank Savings Acct.	5946.49	
Balance		$10992.71

The following were elected to membership as of thirty days after the publication of their names provided no objections to any are received by the Secretary:

Active:

Badenhausen, Otto A.—P. O. Box 33, Westfield N. J. Supervisor, Application Laboratories, Calco Chemical Co., Bound Brook, N. J.

Cargen, George—6374 Dittman St., Philadelphia, Pa. Dyer, Hulton Dyeing Co., 3819 Frankford Ave., Philadelphia, Pa.

Chase, Julian T.—981 Columbia Ave., N. E., Atlanta, Ga. Traveling Representative, National Aniline & Chemical Co., 140 Peachtree Street, Atlanta, Ga.

Christman, W. F.—Alexander City, Ala. Superintendent, The Russell Mfg. Co., Alexander City, Ala.

Collingwood, Joseph—603 Beech Street, Holyoke, Mass. Textile Colorist, Farr Alpaca Co., No. 1, Bigelow St., Holyoke, Mass.

Dohner, Harold B.—1209 Edgewood Road, Brookline Pa. Chemist and Treasurer, W. H. & F. Jordan, Jr. Mfg. Co., 3047 Amber St., Philadelphia, Pa.

Doyle, Harold W.—Grant Ave., Stafford Springs, Conn. Dyer and Chemist, Phoenix Woolen Co., Stafford, Conn.

Fagnoni, Louis—77 No. Taylor St., Bergenfield, N. J. Dyer, Art Silk Dyeing Co., Inc., 65 North 9th St., Paterson, N. J.

Field, H. H.—Dimon Court Apts., Columbus, Ga. Dyer, Eagle & Phenix Mills, Columbus, Ga.

Fuller, Everett H. — 5 St. James Ave., Easthampton, Mass. Asst. Superintendent, Piece Goods Dept., Hampton Co., Easthampton, Mass.

Hardin, J. E.—Summit Ave., Greensboro, N. C. Secretary and General Manager, Proximity Mfg. Co., Greensboro, N. C.

Kerr, Duncan—8881 Kolb Ave., Detroit, Mich. Wool and Cotton Dyer, Ford Motor Co., Highland Park, Mich.

McCann, M. M.—408 Trollinger St., Burlington, N. C. Superintendent, Burlington Dyeing and Finishing Co., Burlington, N. C.

McGrogan, John T.—3534 Englewood St., Philadelphia, Pa. Foreman Dyer, La France Industries, Philadelphia, Pa.

Petschow, Johannes—318 LaFayette Ave., Passaic, N. J. Chemist, Royce Chemical Co., Carlton Hill, N. J.

Theve, Pierre J.—3 Julian Terrace, Norwich, Conn. Foreman, Dyeing and Finishing Depts., J. B. Martin Co., Norwich, Conn.

Yates, James—15 Roland Road, Chester, Pa. Assistant Dyer, Aberfoyle Mfg. Co., Chester, Pa.

Junior:

Carmichael, H. B., Jr.—McDonough, Ga. Superintendent of Mill, McDonough, Ga.

Glass, Edward D.—10 Wells Place, Rutherford, N. J. Chemist, Royce Chemical Co., Carlton Hill, N. J.

Kroth, Josef—365 Main Ave., Passaic, N. J. Chemist, Royce Chemical Co., Carlton Hill, N. J.

Mecco, Jerry M.—70 North Gaston Ave., Somerville. N. J. Textile Colorist, Calco Chemical Co., Inc., Bound Brook, N. J.

Moore, Robert L.—147 East Chestnut St., Kankakee Ill. Laboratory Dyeing, Experimental Dept., Beat Brand Hosiery Co., Kankakee, Ill.

Student:

Allen, Grover S.—119 Fountain St., Haverhill, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Barry, Marie G.—31 Hoyt Ave., Lowell, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Beigbeder, Edgar R.—298 Pawtucket St., Lowell, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Birtwell, John L.—1641 Gorham Street, East Chelmsford, Mass. Student, Lowell Textile Institute, Lowell Mass.

Bridges, K. A.—Griffin, Ga. Student, North Carolina State College, Raleigh, N. C.

Bukala, Mitchell J.—3 Osgood Avenue, Lowell, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Custer, Herbert J. — 4 Hildreth St., Lowell, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Fenn, Harris B., Jr.—221 Beechwood Road, Ridgewood, N. J. Student, Lowell Textile Institute, Lowell, Mass.

Gill, J. Edward—Route 1, Henderson, N. C. Student, North Carolina State College, Raleigh, N. C.

Gillespie, Francis Clifford—192 Middlesex Street, North Andover, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Glowienski, Mitchell—198 West Sixth Street, Lowell Mass. Student, Lowell Textile Institute, Lowell, Mass.

Hockridge, Stanley S.—45 Bracewell Ave., North Adams, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Honeycutt, John D.—Gold Hill, N. C. Student, North Carolina State College, Raleigh, N. C.

Lifland, Bessie—109 Lawrence Avenue, Roxbury, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Markarian, Haig—103 Lawrence St., Lowell, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Meehan, John J.—35 Varney Street, Lowell, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Moody, Leon E.—113 Ludlam St., Lowell, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Morrison, Roland C. — 1073 Lakeview Ave., Lowell, Mass. Student, Lowell Textile Institute, Lowell Mass.

Pizzuto, Joseph J., Jr.—65 Circular Ave., Pittsfield, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Shain, Joseph—41 Stanwood Street, Roxbury, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Sloan, William G.—215 Grace St., Wilmington, N. C. Student, North Carolina State College, Raleigh, N. C.

Spalding, Arthur O.—84 D St., Lowell, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Thomas, Robert J.—24 Loring St., Lowell, Mass. Student, Lowell Textile Institute, Lowell, Mass.

Wells, Henry A., Jr.—470 Jefferson Ave., Elizabeth, N. J. Student, Lowell Textile Institute, Lowell, Mass.

Associate:

Barker, W. R.—1017 Columbia Ave., N. E., Atlanta, Ga. Salesman, Quaker Chemical Products Corp., Conshohocken, Pa.

Bruning, C. R., Jr.—1202 W. Market St., Greensboro, N. C. Salesman, Jacques Wolf & Co.,

Clement, Sam R.—1027 So. 30th St., Birmingham, Ala. Salesman, Swann Chemical Co., 930 Brown-Marx Building, Birmingham, Ala.

Fortner, C. I.—121 Colborne Road, Brighton, Mass. Salesman, Kem Products Co., Inc., 229 High St., Newark, N. J.

Gibson, W. C.—P. O. Box 169, Griffin, Ga. Salesman, The Arabol Mfg. Co., 110 E. 42nd St., New York, N. Y.

Goulston, George A.—181 Allston St., Allston, Mass. Salesman, L. Sonneborn & Sons, 88 Lexington Ave., New York, N. Y.

Ingalls, Elroy D.—44 Ridge Ave., Passaic, N. J. Sales Engineer, The Textile-Finishing Machinery Co. Room 1770, 50 Church St., New York, N. Y.

Keith, John M.—Distributor, E. F. Houghton Co., Rhodes Haverty Building, Atlanta, Ga.

Swift, Edward W., Jr.—1710 Buena Vista Road, Columbus, Ga. Textile Engineer, Muscogee Mfg. Co. Columbus, Ga.

The Council approved the reinstatement of the following names:

George P. Fiendell
Ira S. Hurd
Thomas E. Bell

who have paid up their arrears.

H. R. Davies reported for the Transportation Committee. The Committee was not in favor of the Association's paying expenses of delegates to attend Annual Meetings. A written report will be submitted to the Council.

It was voted to hold the Annual meeting for 1932 on December second and third.

The subject of our joining the Inter-Society Color Council was again brought up. It was voted that the matter be referred to the Committee.

The meeting adjourned at 3:00 P. M.

Respectfully submitted,
A. Newton Graves, *Secretary.*

SEVENTY-SECOND MEETING OF THE RESEARCH COMMITTEE

THE Seventy-second Meeting of the Research Committee of the American Association of Textile Chemists and Colorists was held at the Providence Biltmore Hotel, Providence, R. I., March 11, 1932.

The following were present:

L. A. Olney, *Chairman*
Wm. D. Appel
P. J. Ariente
Wm. H. Cady
Hugh Christison
Howard D. Clayton
Ralph F. Culver
H. R. Davies
Dr. Carl Z. Draves
Dr. Jos. F. X. Harold
B. L. Hathorne
H. F. Lawton
Wm. R. Moorhouse
Dr. Hans Meyer
Dr. D. H. Powers
W. S. Williams
P. J. Wood
A. Newton Graves, *Secretary*

The Chairman again brought up the subject of an additional allotment from the Textile Foundation and explained the relationship between the Foundation and our Association. The Chairman stated that he had an appointment with Mr. Pickard, Secretary of the Foundation at the end of this month, and that he would invite him to attend the Research Committee Meeting that was to be held in Washington April 1st.

Dr. Powers made a report for the Sub-Committee on Research Program, and suggested that each sub-committee submit two or three problems which they believed could be worked on to advantage. Dr. Powers also reported on work done by Dr. Harris and Mr. Smith in Washington.

A report of the Sub-Committee on Rayon was given by B. L. Hathorne. The Research Committee approved with appreciation the work done during the past two years by this sub-committee, and requested them to prepare an account of their work for publication in the Proceedings, it being the understanding that it will be submitted to the Research Committee before publication.

The Chairman reported for the newly formed Sub-Committee on Methods of Analysis and Standardization of Sulphonated Oils, and read a telegram which he had just received from Ralph Hart accepting the chairmanship. The personnel of this committee will be as follows:

Ralph Hart, *Chairman*
G. P. Feindel
S. K. Ford
A. H. Grimshaw
R. A. Pingree
W. Seltzer
W. T. Thomas
A. R. Thompson, Jr.
W. S. Williams

Howard D. Clayton reported on the tentative method for testing the shrinkage of textile materials, and an extended discussion followed in which P. J. Ariente took a leading part.

A short report of the Sub-Committee on Light Fastness was given by Wm. H. Cady.

Hugh Christison reported for the Sub-Committee on Fastness Tests for Dyed Wool. A new test for fulling has been developed and a complete report will be submitted for publication. B. A. Ryberg, research associate who has been doing the laboratory work for this sub-committee exhibited samples and explained with detail how the work had been done.

Tentative arrangements for the next meeting to be held in Washington, April 1st were discussed, and an invitation extended by Mr. Appel for all members of the Council and Research Committee to spend the morning of that day in visiting the Bureau of Standards.

The meeting adjourned at 5:30 P.M.

Respectfully submitted,

A. NEWTON GRAVES,
Secretary.

AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
Professor of Chemistry and Dyeing, Lowell Textile Institute
Directing Editor

NORMAN ALBIN JOHNSON
Managing Editor

MYRON DREW REESER
Advertising Manager

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Volume XXI April 11, 1932 No. 8

KNITTING ARTS EXPOSITION

TODAY marks the opening of the twenty-eighth annual Knitting Arts Exposition. It is held under the auspices of the National Association of Hosiery and Underwear Manufacturers at the Commercial Museum in Philadelphia and will continue through Friday the fifteenth. According to Chester I. Campbell, who is directing the exposition, it will be practically as large and complete as any held heretofore.

This exhibition is quite in a class by itself and is the largest of its kind held in this country if not the entire world. Visitors attend this show from all parts of the country as well as from abroad. It is a very complete exhibition and represents a true display of the entire knitting trade, with full lines of the necessary machinery for making all types of knitted fabrics, together with all equipment and materials for dyeing, finishing, drying, packaging, etc.

Visitors have the opportunity to examine all the latest machinery and processes in actual operation. The knitting goods manufacturers find the exposition of immense value as it exhibits under one roof all essentials and accessories pertaining to the trade. They are enabled to see all this at one time without the unnecessary expenditure of time or money that would be called for were there no such exposition being held.

Exhibitors have learned in past years the value of the exposition to themselves, and the fact that they continue to show their products year after year, indicates that they fully appreciate its value. If it were not for this exposition it would cost them a great deal to interview the same number of prospects and it would take considerably more time to accomplish the same end.

The 28th annual convention of the National Association of Hosiery and Underwear Manufacturers will be held on Thursday, April 14th at the Museum. The convention will consist of a short single-session business meeting, to be called to order at 11 A. M., and to be over before one o'clock. These two events are always something which no progressive manufacturer should miss, and this is particularly the case this year, when every mill man who has the slightest intention of staying in business should be alert to new ideas, new machinery and equipment, and new contacts. At such a time as the present when every one should be open to suggestions as to better equipment and processes and for the knitting trade there is no better place to inspect them than at the Knitting Arts Exposition.

Of particular interest to the readers of this journal should be the exhibits of the dyeing machinery manufacturers, the dye manufacturers, the manufacturers of finishing and processing materials, and the manufacturers of textile specialties, all of whom will be represented at the exposition.

If you have not made arrangements to visit this show it is still not too late to make plans to do so.

DESIGN REGISTRATION

THAT both the Silk Association of America and outstanding organizations in the silk industry and its affiliated trades are seriously endeavoring to maintain design integrity and quality by making every effort possible to insure design protection is becoming continually more evident. The number of trade names registered during the last few months, and particularly since the inauguration of recent drives to enforce these protective measures, has increased tremendously. There need be no fear that the move to protect designs is merely a temporary flurry of indignation. The industry can rest assured that the protective measures will be strengthened as time goes on.

Two encouraging steps in this direction have been taken recently. One is the appeal that the Association has just made to the industry to respect ownership of print designs and to co-operate in maintaining design integrity. The other is the statement just issued by the United Piece Dye Works in which this organization took, as it were, this oath:

"We believe the present method of design registration has proven itself to be the best yet devised to protect the originator and owner of a Print Design. We continue to require the registration of designs to be processed by us."

Undoubtedly the most practical and beneficial way now open to all factors concerned is to insist upon the registration of designs and to follow this lead by assiduously registering all designs. This is the next best thing to governmental assistance. Eventually Congress will doubtless take steps to protect designs, but until this happens the registration of designs has become almost an absolute necessity.

COMFORT OF WORKERS

THE atmosphere in which we work and the air we breathe are of course essential to life and control to a large extent our efficiency and general healthfulness.

When impurities are present or there are deviations in the amounts of the ingredients ordinarily present in the air, they have a serious effect on the functioning of the body. Many thousands of dollars have been spent in the last few years in developing satisfactory methods of properly providing acceptable working conditions for indoor workers. The chemical constituents of the air have no affect on the comfort of workers under ordinary conditions.

The physical properties of the air such as rate of air movement, moisture content, and temperature determine the comfort or discomfort of the worker. It was at first thought that controlling the air temperature was the best method of providing suitable conditions, but while this is still true to a certain extent it has now been determined that moisture content has just as much bearing on the comfort of the worker.

According to a booklet published by the Metropolitan Life Insurance Company entitled "Air Conditions and the Comfort of Workers," the following conditions are recommended as being most suitable for the greatest number of workers. For winter: A temperature range between 68° F. and 72° F. is generally accepted as the proper temperature for sedentary workers; a range of relative humidity between 40% and 60% appears to be practicable and acceptable; and an air movement of about 25 to 35 linear feet per minute is usually satisfactory. For summer: The above conditions apply except that it has been found impractical to reduce the indoor temperature more than 10 to 15 degrees below the outside temperature under maximum outside conditions and the inside temperature should approach the outside temperature as the latter approaches 80° F.

BUY AT HOME

IN THE past, when submitting bids for the advertised requirements of the various government departments, there has been no provision made for giving preference to the products of domestic manufacturers. As a result foreign producers were able to compete with the home producers on an equal footing. Our own manufacturers will doubtless welcome the new bill which has been passed recently which places them in a more favorable position when submitting bids.

The bill as passed by both houses and signed by the President reads as follows:

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that in the expenditure of appropriations for the military and non-military activities of the War Department, the Secretary of War shall, unless in his discretion the interest of the Government will not permit, purchase or contract for, within the limits of the United States, only articles of the growth, production, or manufacture of the United States, notwithstanding that such articles of the growth, production, or manufacture of the United States may cost more, if such excess of cost be not unreasonable."

Sulphonated Oil Manufacturers Meet

Material progress was made at a recent meeting of the Sulphonated Oil Manufacturers Association in the furtherance of its program of constructive activities designed to improve industry conditions.

Tentative Seal of the Association.

In order to focus the attention of the manufacturers of sulphonated oils on the desirability of placing their relationships with each other and with the consumers on the highest ethical plane, a Code of Business Practices, which had been drafted by a committee appointed at the preceding meeting, was thoroughly discussed and tentatively approved. The Code will come up for formal adoption at the next meeting.

The Committee on Testing and Grading Methods reported progress and the Chairman stated he hoped to submit a complete report to the next meeting for discussion and ratification.

A committee was named at this meeting to develop a statistical reporting plan for the collection of monthly or quarterly statistics, to be gathered and disseminated either by the Secretary or through the Census Bureau at Washington. This subject will be further considered at the April meeting.

It was also suggested at the meeting that a survey of cost accounting methods might prove to be of great benefit and value to the industry, and a committee was appointed to give the subject further study and report at a subsequent meeting.

It is the general feeling of the Association members that, although the organization is only three months old and has held but two meetings, the groundwork is being laid on which a structure of service to both the sulphonated oil manufacturers and their customers can be erected.

Correction Re Calco-Zinsser Transaction

The March 14th issue of *The American Dyestuff Reporter* carried a news item under the caption "Calco Purchases Zinsser." This was quite erroneous, as the caption should have read "Calco Purchases Zinsser's Alkali Blue and Iridine Violet Business." Only these two products and the apparatus for their manufacture were concerned in this transaction—all other products of Zinsser & Co., will continue to be produced by them as in the past.

Irregular Dyeings in Gauze Stockings*

By **PROF. DR. P. KRAIS**

This article constitutes a communication of the German Research Institute for the textile industry of Dresden; a lecture delivered by Dr. Krais during the 11th general meeting of the Institute, on September 20, 1930.

THE mercerization of cotton, especially Egyptian cotton, by treatment with concentrated caustic liquor under tension, is, as we know, one of the most important finishing operations of the textile industry. In yarn, as woven goods, and as finished goods, cotton is mercerized in extremely large quantities. Mercerization has this great advantage over most of the other methods of finishing: that the results are absolutely stable and lasting. The gain in luster, tensile strength, and affinity toward dyestuffs is permanent.

Our Institute, especially during the last year, has had much to do with difficulties which arise from the fact that stockings manufactured from singed and mercerized Mako yarn, the so-called gauze yarn (Florgarn), have shown irregularities in dyeing. As is so often the case, the responsibility for the faulty results had been shifted from shoulder to shoulder, from the dyer to the mercerizer, from the mercerizer to the spinner, etc.; and the task of finding out who should actually bear the blame for the difficulty was imposed upon us. Considering the great quantities of goods concerned—oftentimes up to one-third of a whole lot had to be relegated to the second and third grades because of the faulty dyeing—the claims for adjustment were often very earnest and pressing in nature.

Since the defective goods were forwarded to us in an actually impressive series by the spinners, mercerizers, dyers, finishers, fashioners, and dealers, with the most various suggestions as to the cause of the defects, it was necessary for us to attempt the bringing of the complicated series of phenomena into some order, and to take into consideration all points, which could possibly bear upon the problems; and, further, to develop for each case a method of determination which should be as certain and definite as possible. Up to the present, we have not succeeded in performing the task as a whole, but we have, nevertheless, gained more certainty upon several points than we at first possessed, and we have also, in part, come to conclusions not in agreement with those of other experts. Accordingly, the present occasion may serve for a statement of the present condition of the situation, as it stands today in our Institute.

The number of cases of defective dyeing has essentially increased in recent years, apparently because the present mode demands mostly covered, only yellow to reddish-brown tones in stockings, instead of the earlier, almost exclusively customary light and brilliant colors. For the tones now most in favor, the bleaching of the raw stockings is no longer necessary, because the tone of the Mako yarn is already very close to the tone of such dyeings. Through bleaching, it is certain that numerous inequalities in the material are levelled out. This is plainly proved by the fact that cases are known to us, in which, after stripping of the unlevel dyeings, bleaching, and redyeing with good, level-dyeing colors, the defects are no longer evident.

Kinds of Defects

Now, the kind or class of defect is of widely varying nature. We can in a general way distinguish five principal classifications:—

1—Stepwise alteration of tone; a more or less sharply defined transition in tone from a lighter to a darker, or from a darker to a lighter one. The boundary between the two tones is always recognizable by the presence of a knot in the yarn. The cause of this difference in tone may be

a—use of different lots of raw yarn. When this is the case, the difference in tone can often be rectified by stripping, bleaching, and redyeing; especially when there are only slight differences in tone in the raw yarn, these can be equalized through the bleaching, or else one can discover differences even in the aspect of the cotton itself.

b—use of different lots of mercerized yarn. The cause of the difference in this case will be taken up later; usually it is possible to compensate for the unevenness of the dyeing by stripping and remercerizing in one lot before redyeing. But this remedy is too expensive and uncertain.

2—short, light spots, which have taken up less dyestuff than the rest of the yarn. The appearance of these spots is the same, from whatever angle one views the goods. This difficulty is due to an error in mercerization, which will be taken up later.

3—short, light spots, which appear brighter and more lustrous when the goods are viewed from one angle, and darker if viewed from another angle. These defects are

* Monats. f. Textil-Ind. 46,21 (1931).

due to errors in spinning; are purely optical in nature, and cannot be rectified.

4—Annular tone-differences; the stocking is covered wholly or in part with lighter or darker rings, which alternate fairly regularly. This defect may be one originating in the mercerizing, or in the knitting.

5—Abrupt alternation of light and dark areas in the sole. This occurs when a mercerized and unmercerized thread were used for the double thread from which the sole is made; the two kinds of thread appear alternately upon the surface. This is obviously due to an oversight of the knitter.

Sources of Difficulties

The sources of these difficulties, apart from the points especially emphasized above, can be traced back to the following:—

1—Non-uniform spinning, the so-called "Schnittigkeit" (in English called "twittiness"—a condition met with when, for some reason, the material before the twisting becomes drawn out at one point so that the group of separate fibers is of smaller cross-section than the rest, the twist becoming accentuated at this thinner point, and the finished yarn at that point being much narrower in cross-section, and denser). This unnaturally denser portion possesses a harder twist, and even appears denser in consistency, than does the normal yarn-strand.

2—Non-uniform steaming of the cops. The higher the temperature during steaming, the darker and deeper the dyeing of the Mako yarn.

3—Errors in singeing. If part of the yarn or twist escapes the singeing, such a part remains more felt-like, "fuzzy," on the surface, and appears lighter when dyed.

4—Impurities in the water used in twisting, e.g., through fouling in the warmer season of the year, or through other kinds of decomposition, or also because of the dust from the singeing process.

5—Errors in mercerization, especially through incomplete taking up of the caustic liquor through incomplete wetting-out of the yarn. This may take place when prewetted yarn is allowed to dry out partially, before it reaches the mercerizer, or when, through too tight drawing of the skeins, the penetration of the caustic liquor is hindered. In this case, the faulty spots will be found to recur periodically; for example, at the ends of the skeins. In already mercerized skeins, the condition can easily be recognized under the light of the ultra-lamp.

Mercerized Mako cotton appears dark-brown under the ultra-lamp, unmercerized material is of a bright, yellowish brown. This difference in appearance is so great that any misapprehension is impossible. Also, in the finished stockings, before dyeing, this distinction is plain; after dyeing, it can be detected after stripping the dyestuff. It may be mentioned, incidentally, that the ultra-lamp is very useful also for the distinguishing between mercerized and unmercerized linen and ramie yarn, although the distinctions are not as plainly evident as in the case of cotton. But here, as in many other cases of observation, made with the ultra-lamp, it is always to be noted that one gains only indications, guides, to the truth, and that these indications or suggestions must always be checked up by more careful, definite methods of actual proof. Such a method, in the case of mercerized and unmercerized cotton, would be the treatment with the zinc-chloride-iodine reagent, followed by washing with much water. With this reagent, unmercerized cotton goes over quickly through a brown color to a white, while mercerized cotton remains colored a blue-black for a long time.

This procedure, however, as we shall see a little later, involves some uncertainties, and therefore we have given it up, and use now only the microscopic "count-off method." We test 1000-1200 separate fibers under the microscope (which with a little practice can be done very rapidly). We can distinguish between well-mercerized fibers, which resemble a glass rod in form, or at least show plainly the swelling of fiber which mercerization causes, and fibers which have been bady or not at all mercerized, these showing still the characteristic band-like spirals of the raw cotton fiber. In mercerized yarns we find 70-80 per cent, often as much as 90 per cent, of well-mercerized fibers. As soon as the value falls below 65 per cent, there exist grounds for believing that the mercerization has been insufficient; unmercerized yarn contains, among 1000 fibers, not more than 5 or 6 which appear as though they had been mercerized; so that the distinction is not to be mistaken. (In the case of mercerized piece-goods, the percentage is not so high, for we have to reckon with only 50-60 per cent of well-mercerized fibers. But this case does not come into relation with the preceding.)

6—Other errors in mercerization, or at least those for which the mercerizer is to be held responsible, may be met with, if irregular portions are met with after mercerized yarn is dry. Edmund Knecht, as long ago as the year 1908 (cf. the reference in Lehne's Faerberzeitung, 1908, p. 323) pointed out that mercerized cotton gains the power of taking up quite different quantities of dyestuff, according to whether the yarn has been dried or not before the dyeing. He ascertained that, under like conditions, the amount of Benzopurpurine 4B taken up by mercerized cotton was as follows:—

a—dyed without drying	3.24%
b—air-dried, then dyed	3.03%
c—dried at 110° C., then dyed	2.51%
d—unmercerized, well wetted out	1.77%

Therefore, according to the temperature of drying, there comes into being different conditions of swelling; we have observed that these conditions, once established, remain unchanged by after-treatment. If, then, the mercerized yarn has once been air-dried, the fibers retain the same condition of swelling which has been established, even though the yarn is afterward redried at 110°C. These different states of swelling, however, show no difference whatever under Roentgenographic or ultra examination, and so naturally no difference in the microscopic count-off. A distinction is very evident with the zinc-chloride-

iodine reagent, but it has led to misconceptions. The differences in dyeing cannot be levelled out by stripping and redyeing, nor by ever so careful a first dyeing; only by stripping and repetition of the mercerization.

Briefly, then there are therefore two classes of defective mercerization; the one arising through uneven mercerization, recognizable under the ultra-lamp, and determinable by counting out under the microscope; the other, arising through uneven drying, and recognizable only by the disappearance of the unevenness through remercerization.

Uneven drying can occur in different ways, e.g., if the yarn is allowed to dry out, partially, externally, in the air, before it reaches the drying-chamber, and also internally, if the interior of the yarn is still wet when it leaves the drying-chamber.

7—The condition of stepwise gradation in color-tone arises, as mentioned previously, through the use of different lots of yarn, or of mercerized yarn, in one stocking. In case of mercerization, it can be due not only to the degree of mercerization or differences in the drying, but also to another cause, namely, the presence of varying amounts of fatty acids or lime soaps, or other precipitates originating in the use of hard water. We have cleared up differences, in this connection, through treatment of the goods, first with 1% cold HCl, then with warm 1% ammonia water. It can be proved by a simple test that the first extract contains calcium, the second one soap; this latter one foams, and on acidification becomes turbid. Such contaminating agents originate in the soaping of the yarn, to soften it, after mercerization, souring, and rinsing.

8—If the yarn, after mercerization, goes through the rinsing into the knitting, further dangers attend its course. These come from the use of unsuitable softening agents, such as are inclined to resinify. Where, in such a case, a spool of yarn resinifies in the air, on the outside, periodical inequalities in the dyeing occur, because the oil or fat, in the resinified condition, can no longer be removed by the customary agents. Or, it may be that the yarn, in one of the machines, has to pass over a roughened part of the machinery. It is then itself roughened, and so a periodical annulation (formation of rings) in the dyeing takes place, which one might at first sight refer to the spinner, but which actually should be laid to the account of the winder. These points, however, are not yet completely cleared up. It is always important to work out the periodicity of such inequalities, before one can draw any conclusions.

9—Finally, the dyer may get uneven dyeings, if he does not sufficiently cleanse the stockings from oil spots, etc., before the dyeing. These errors, however, can easily be traced down and corrected by redyeing. Likewise, unevenness from merely careless dyeing can be thus rectified. Such difficulties, however, are comparatively rare, and show up in quite a different manner from those taken up above.

Conclusion

There is, then, a large number of difficulties which threaten the gauze stocking before it reaches the state of an article fit to be sold. As soon, however, as one recognizes all these dangers, one can avoid them. But, in any case, this sort of goods demands great skill and strenuous oversight. We believe that we have rendered the industry a service, in thus going into the manifold sources of difficulty in this field.

In the literature there has recently been described a new, patented method of mercerization, in which the cotton is mercerized in the form of spinning cops, in a vacuum. Experience will show whether this procedure guarantees a sufficiently uniform mercerization.

More important appears to be another procedure, which we have already recommended in various quarters, without, unfortunately, its meeting much approval. This is, mercerization in the knitted form. If one mercerizes thus instead of in the yarn, it would be possible to work considerably more cheaply, uniformly, and safely than is now possible. Mercerization at this stage is carried on in England, and still more so in America, to a very large extent, but with us it appears not even to have begun. And yet, we believe that the future of the mercerization of yarn lies in this direction.

Luncheon-Reception to President of U. S. Institute

A luncheon-reception to be tendered to President Garvan by the Board of Directors and members of U. S. Institute at the Biltmore Hotel, New York City, Friday, April 29th, promises to be the most important and interesting function in the history of the organization. It is planned to start the luncheon at 12:30 P. M., and follow it with a speaking program which, other than the principal address by President Garvan, will be confined to brief talks by a number of the industry's leaders and men prominent in industrial research.

The presidents of leading textile associations will be invited guests of U. S. Institute. Among those who have already promised to attend and speak are Franklin W. Hobbs, chairman of The Textile Foundation and president of the National Association of Wool Manufacturers; George A. Sloan, president of the Cotton-Textile Institute, and Maurice Holland, director, division of engineering and industrial research of the National Research Council.

Note: We have just received a notice stating that the luncheon-reception will be held on May 4th as Mr. Garvan will be unable to be present on the 29th of April.

India Coal-Tar Dye Imports Show Value Increase

Imports into India of coal-tar dyes declined in quantity from 19,000,000 pounds in 1929-30 to 16,500,000 pounds in 1930-31, but increased in value from 19,700,000 rupees to 20,800,000 rupees. (Rupee 1929 = $0.3636; 1930 = $0.3607.) Aniline dyes formed 77 per cent of the total, compared with 70 per cent in the preceding year while alizarine dyes continued to decline in quantity and value.

The Development of Hosiery Dyeing Machinery

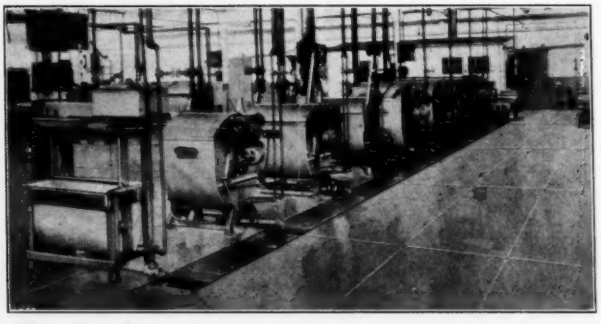
(Continued from page 242)

and the general suitability for the fibers to which they are to be applied, and these facts are considered before comparing for money value.

To obtain clearness in shade, it is necessary that a supply of pure soft water be available, or, if this is lacking, to provide means of softening the water, and filtering it in order that the goods will not be covered with a film of dirt, insoluble soaps or oils. When soap is used in the dyeing operation, it should be readily rinsible. If oils are used, they should be of high emulsion quality. Dyestuff and chemical solutions should be fed into the machine through a fine mesh screen, or cloth filter to prevent undissolved particles from entering the dye bath, and adhering to the fabric.

The element of time is of the utmost importance. The duration of the dyeing operation should be as short as possible, in order that the goods will not be overworked, and injured by friction. Time is also important in meeting the present-day condition of hand to mouth production, and demand for quick delivery.

It is essential that succeeding dye lots match uniformly, and therefore, they are matched against established standards, not only in daylight, but also under artificial light. The hosiery must be evenly dyed throughout, seams well penetrated, and in case of mixed fibers, a good union obtained.



Illustrating another typical installation in a modern hosiery dyehouse.

The problems which vary according to individual types of hosiery are:

1. Dyeing
2. Finishing.

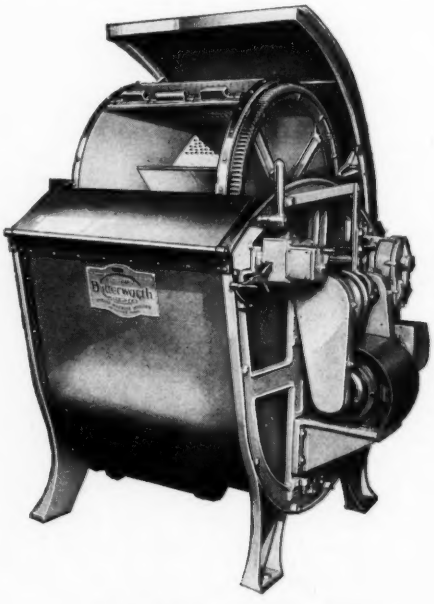
The processes of dyeing differ, more or less, according to the type of hosiery handled. Thus, in the dyeing of silk, or silk and cotton hosiery, two operations are required. It is necessary to remove the sericin, or silk gum, before dyeing, and this is done by the boiling-off with a neutral soap, or so called boil-off oils. There are two methods in use today.

A. The two bath method by which the hosiery is first degummed, and, after thoroughly rinsing, dyed in a neutral bath.

B. The one bath method, by which the degumming, and dyeing is done at the same time. This method, while requiring a somewhat higher degree of skill on the part of the dyer, is advantageous because it lessens handling of the goods, and results in more even dyeing as well as better penetration. Neutral dyeing acid colors and direct cotton colors, are used in both methods.

Hosiery made of wool; wool, silk and cotton; cotton and artificial silks; and artificial silk, require light scouring before dyeing, while cotton hosiery is wetted out well.

Wool and silk hosiery is dyed in an acid bath, with either acid colors or, with acid and mordant acid colors, leaving the silk white. If cotton is present, this is then dyed in a short warm bath, with direct cotton colors, which do not affect the wool and silk. The silk may be speck dyed at the same time, if heather effects are desired.



A typical modern hosiery dyeing machine.

Cotton hosiery is dyed in a slightly alkaline bath with direct cotton, or developed colors. Sulphur colors are also used. Cotton and artificial silk hosiery is dyed with direct cotton colors. The dyeing of this combination requires careful control of liquor, temperature, time and amounts of dyeing assistants because viscose, and cupra-ammonium silks have a greater affinity than cotton for dyestuffs.

Acetate silk is also used but generally when white thread effects are desired. In such a case care must be taken in using only such dyestuffs as will leave the acetate silk unstained.

The finishing compounds which are used in hosiery dyeing vary a great deal, depending on what is wanted. In some instances, it is desired to impart a soft handle to the goods, while in other instances, a stiffening finish is required. In the case of silk hosiery, a scrooping with acetic acid may be all that is desired, while in other cases no finish is applied. Glues, gums, sulphonated oils and mineral oils are used to impart the finish wanted. At times a demand for a special finish is felt. Such was the case a year or two ago when silk hosiery, made of tram yarn, was chemically delustered to imitate the lower luster of the grenadine yarn. Today delustering of hosiery is chiefly confined to hosiery made of artificial silk.

The Present Status of Hosiery Dyeing

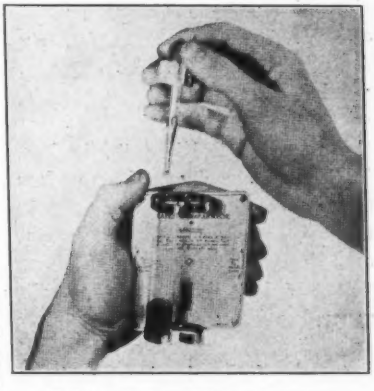
The dye-house of old, which had its inception under rather unfavorable conditions, since there was very little known about the art of dyeing and equipment was not procurable, has been replaced by a dye-house which is thoroughly modern in construction, equipment and economy of operation. Consideration of light, ventilation, heating, draining facilities, condition of water, all factors which had been neglected, are of highest importance in the construction of the modern dye-house. It is equipped with the most modern of machinery and space is provided for a research and testing laboratory. The need for technical control of dyeing operations being recognized, the manufacturer has enlisted the aid of the textile chemist and colorist either in the capacity of dyer or as collaborator with the dyer. Hosiery dyeing today is on a sound basis, and the mutual cooperation that exists between this department, and other departments of manufacture, proves beneficial not only in the better results obtained, but also in the economy of operation. The demands on the art of dyeing are greater than ever but they are being successfully met.

Compact Testing Apparatus

DEVELOPMENT of a compact kit for the rapid testing of boiler feed water; processing water; and scouring, degumming, and bleaching baths has been announced by A. Drucker & Co., 1507 East 55th Street, Chicago. The eastern representative of this company is Louis H. Joseph, 840 Broadway, New York. Among the determinations which can be made with this outfit are included pH values ranging from 3 to 11; hardness of water; and sulphate, chloride, carbonate, bicarbonate, hydroxide, and free (CO_2) content. One of the chief advantages cited for the apparatus is that the system of testing has been so simplified that the plant operator can make his own tests quickly and accurately.

Rapid testing kit.

The kit consists of a comparator for making pH determinations by the colorimetric method, a pipet and test tube for measuring and holding the solution to be examined, funnel, filter paper, the necessary indicators and reagents, and an instruction book. The reagents are supplied in non-leakable, bakelite-top dropper bottles. Specially designed droppers are employed which deliver a drop representing one grain per gallon, thus eliminating the need of burettes in making titrations. The color standards employed in the pH determination are reproduced from 5 cc. buffer solutions and are matched in daylight. Pigments were selected to withstand fading. It is stated that end points are easily distinguished and that results are sufficiently accurate for power-plant and process control. The apparatus is intended for field and plant use and is not intended to replace laboratory methods.



Method of determining pH value.

New Products

The Melrose Chemical Co. of Melrose, Mass., manufacturers of finishing compounds, soap, sizes and oil are announcing the addition of four new products to their line.

Melco Voilegumm is a special product developed for the finishing of cotton and rayon voiles, scrims and marquisettes, especially where the new "sandy feel" is required.

Melco Scourall, a scouring assistant for wool, worsteds, and cotton, and an aid in boiling off rayons and synthetic fibers.

Melco CNA Delustrant, a compound that embraces two important features, namely, the delustering of rayons and synthetic fibers and also acting as a finish where softness and body are required.

Melco Tinting Blue, a product made especially for bleacheries that require a bluing for whites that does not change under artificial light, and fast to light and washing.

Technical Notes from Foreign Sources

Lake Formation from Organic Dyestuffs

Farben-Chemiker 2, 562 (1931).—An abstract of a part of "Handbuch ueber die Herstellung u. Verwendung der Druckfarben," by H. Hadert, published during the year by the management of the journal cited.

The general method of forming lakes by precipitation hardly needs much comment, but there are some points mentioned in the review that it may be of interest to mention. The principle involved is strictly the precipitation of a dyestuff in the form of an insoluble, suitably colored derivative, upon a wholly inert, finely divided substratum. The substratum, generally speaking, as wholly inert, has no affinity for the dyestuff, and has to be used in conjunction with a so-called fixing agent, which with it forms the colored, insoluble compound, which, as it forms, coats the particles of the substratum. Since the choice of the precipitating agent is governed by the special properties of the dyestuff, certain apparent parallels exist between the process of lake-precipitation and ordinary dyeing. With the same dyestuff, one often can prepare a lake in more than one way, just as, e.g., a sulphonated alizarine dyestuff may be applied to a fiber as an acid or as a mordant dyestuff.

The author divides the dyestuffs possibly used into six general groups:

1—Substantive and acid dyestuffs (including the acid alizarine derivatives) which can be precipitated with metallic salts, especially barium chloride.
  a—capable of precipitation with barium chloride upon pure barium sulphate.
  b—requiring also aluminium hydroxide to be present.
2—Those dyestuffs capable of precipitation upon aluminium hydroxide alone, as this is precipitated in the mixture.
3—Those dyestuffs precipitated after the manner of an alizarine lake.
4—Pigment-dyestuffs.
  a—Those occurring in paste, powder, etc., in commerce.
  b—Those which can be produced only upon a substratum.
5—Basic dyestuffs which can be precipitated upon
  a—"green earth," b—"fixing clay," c—with tannin and tartar emetic, d—with rosin soaps.
6—Dyestuffs used in combination, i.e., reacting acid with basic dyestuffs, when the dyestuff salt so formed is an insoluble compound.

In the fastness properties of the finished lakes are fully as important as in the case of simple dyestuffs applied to fibers. Some properties exist which are not found in dealing with ordinary fiber-dyeings; e.g., fastness to alcohols, oils, etc., also covering power and color-depth. And the difference in light-fastness according to what fiber the dyeing is made upon, a point usually of little importance in ordinary dyeing, is here, in the case of different substrata, of considerable importance. There are some peculiar cases existent; for example, one dyestuff, in the lake form, may fade rapidly in light down to a certain diminished depth of tone, which latter then becomes very resistant to further action of light; still others are quite considerably fast to light for some time, only finally to begin fading, and rapidly, after that time.

Other interesting points are brought out, but they have less connection, even by parallel, with ordinary dyeing-practise.

Azo Dyestuffs Containing Chromium

German Patent No. 453,949 (22/XII/'27)—*I. G. Farben-Ind. A.-G.*—Azo dyestuffs containing the azo group in the ortho position to a hydroxyl are treated with a chromium compound which will introduce chromium into the dyestuff molecule, and the so chromed dyestuff is further treated with various reagents; e.g., if the dyestuff so chromed contains a nitro-group, this can be reduced by a suitable reducing agent without disturbing the chromium, and converted into an amino or axoxy group. One exception is noted; the chromium derivative of the dyestuff obtained from the diazo derivative of 1-amino-2-naphthol-4-sulphonic acid and alpha-naphthol is not to be treated with nitrous acid. (This would simply convert the 1-amino-2-hydroxyl grouping into a 1-2-quinone). Four examples are given.

Indigoid Dyestuffs

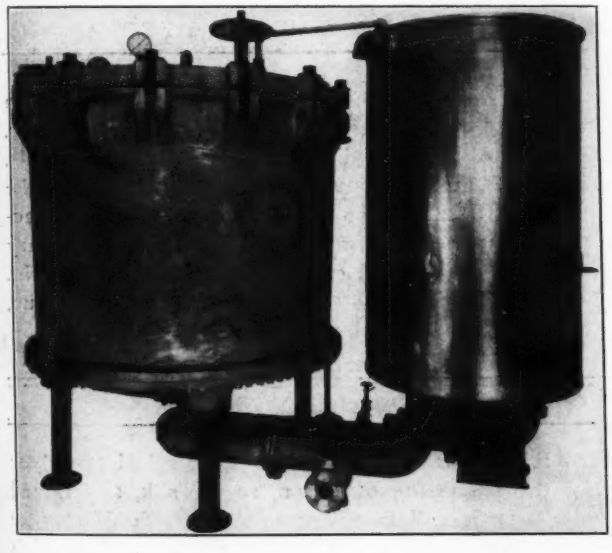
German Patent No. 453,087 (28/XI/'27).—*Gesells. f. Chem. Ind. in Basel.*—The method specified proceed from those naphthoxy-thiophenes, in which the CO group of the thiophene complex is attached to a beta-carbon of the naphthalene nucleus. Such intermediates are condensed as usual with such other compounds as are in customary use in such syntheses; isatines, thionaphthene-quinones, acenaphthene-quinone, etc., or their substitution products or anilides, etc. In some cases, the dyestuffs formed are halogenated, except in two general cases; the condensation of 1-2-naphthoxy-thiophene with alpha-beta and beta-alpha naphtho-thiofurane-1-2-diones and their nuclear substitution-products; and products of the Indirubine series (condensation of 2-3-naphthoxy-thiophene with cyclic diketones). The products dye in fast violet, blue, and blue-red tones.

Lower Prices

Because of increased sales and increased production in the past several months, the Celanese Corporation has found it possible to effect savings in the production costs of a number of SRA dyestuffs which have brought about a lower sales price.

Franklin Process Raw Stock Dyeing Machine

This new machine does not replace older models but is an addition to the line. It operates on the same principle as other models, but differs in that it is entirely of cast metal alloy construction. This model is claimed to be particularly suitable for the dyeing of light, delicate shades. Very few dyestuffs are sensitive to the alloy used in this machine. Furthermore, it is said to be practically self-cleaning, so that it is possible to change from dark to light shades with a minimum of cleaning. For the benefit of those who are not familiar with this type of machine, it operates with a closed kier under pressure. The expansion tank, through which the dye liquor is added, is open. The dye liquor is circulated through the stock in one direction, from the top down. After being dyed, the stock is removed from the machine by means of a false bottom and center post to which is attached a chain hoist. The advantages claimed for this type of



equipment are superior condition of the stock after dyeing (resulting in manufacturing economies), reduced labor cost, lower upkeep, and a saving in dyestuffs, chemicals, and steam. Depreciation of building and equipment is also claimed to be retarded because of the absence of dyehouse fog. It is marketed by the Franklin Process Co., Providence, R. I.

Lockwood to Become Naval Stores Consultant

J. E. Lockwood, for the past 12 years connected with Hercules Powder Company's naval stores activities, has resigned as of April 1.

Mr. Lockwood, who has been active in naval stores work for 24 years, will open his own office in Savannah, Ga., where as a consulting engineer, he will specialize on naval stores problems and their solution and naval stores possibilities and their development.

Hercules Powder Company has retained Mr. Lockwood as a consultant to act in an advisory capacity in respect to naval stores matters, it is announced.

Haiti Supplying American Logwood Requirements

According to Vice Consul Corey F. Wood, Cape Haitien, reports indicate that Haitian logwood exports held up better in 1931 than any other export commodity. Considerable competition from Jamaican logwood due to the decreased value of the British pound sterling is being felt, however.

Imports of logwood into the United States by countries during the calendar years 1930 and 1931 are shown below:

	—1930—		—1931—	
	Tons	*Value*	*Tons*	*Value*
Mexico	6,452	$87,718	3,521	$86,391
Jamaica	1,175	22,416	1,050	18,110
Haiti	16,626	264,612	17,292	279,197
Total	24,253	374,746	21,863	383,698

Committee on Unemployment

A committee on unemployment and relief for chemists and chemical engineers is now functioning through an office located at Room 1004, 300 Madison Avenue. The sponsoring societies are the American Chemical Society (New York Section), the American Institute of Chemists, the American Institute of Chemical Engineers, the American Electrochemical Society, the Association of Consulting Chemists and Chemical Engineers, Inc., the Societe de Chimie Industrielle (American Section), and the Society of Chemical Industry (American Section). The aim of the committee is to list all chemists and chemical engineers within a radius of fifty miles of New York so that when positions are open the necessary contacts may be made. There is no charge for registration or service.

Pratt Institute Chemical Alumni Dinner

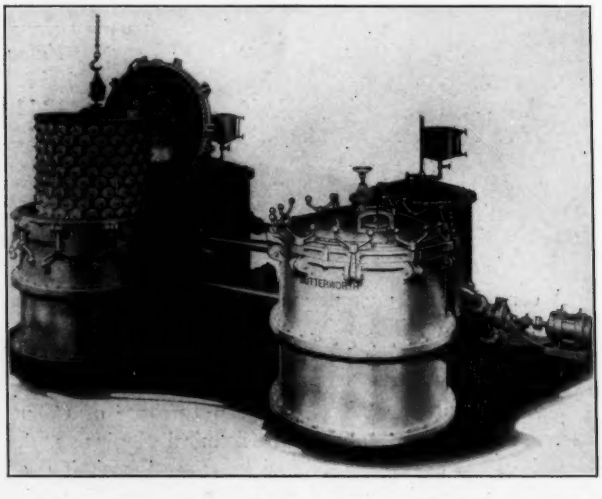
The annual dinner of the Pratt Institute Chemical Alumni Association will be held on April 21st at the Hotel Taft. Tickets may be obtained from the secretary, William A. Black, 253 West 16th Street, New York City. The speakers will be Capt. Tim Healy, Capt. W. Ainsworth and Gen. N. A. Metz, and also a member of the Board of Directors of Pratt Institute.

New Butterworth Dyeing Machine

The Ultra Package Dyeing Machine, a development by the engineers of H. W. Butterworth & Sons Co., is said to be a radical departure from all other machines used in package dyeing of yarns on tubes or beams. With this new machine the dyeing can be done either from the inside out or the outside in.

The standard type of dyeing kier has been entirely re-designed, so that now an even pressure current is distributed over the whole length of the kier, and the packages or beams are subjected to a constant spray of dye liquid which attacks the material gently from all sides—uneven dyeing is claimed to be entirely eliminated.

The Dyeing Kier consists of four major parts, i.e., an inner perforated cylinder, an outside solid cylinder, the bottom part, and the cover, which latter is also provided with a handy sampling device to enable one to take a sample of the material to be dyed at any time without first opening the lid or cover of the machine. If desirable, these four kier parts can be shipped separately to be assembled on the job where the machine is to be erected.



A fifty pound Ultra Package Dyeing Machine will be shown at the Knitting Arts Exhibit in Philadelphia, April 11th to 15th, where literature will also be available. Booths 283-284.

Literature may also be obtained direct from the manufacturer.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

VAT DYER

Practical dyehouse experience over seven years with vats and naphtols on cotton, rayon and silk. Over ten years' experience with other classes of dyestuffs. Best references. Will locate anywhere. Address Box No. 727, American Dyestuff Reporter, 440 Fourth Avenue, New York.

POSITION WANTED

Textile Chemist and Colorist with ten years' practical experience, being available, solicits inquiries. Address Box No. 710, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

POSITION WANTED

Experienced dyestuff salesman, also demonstrator, desires connection. Would consider taking charge of a dye-house.

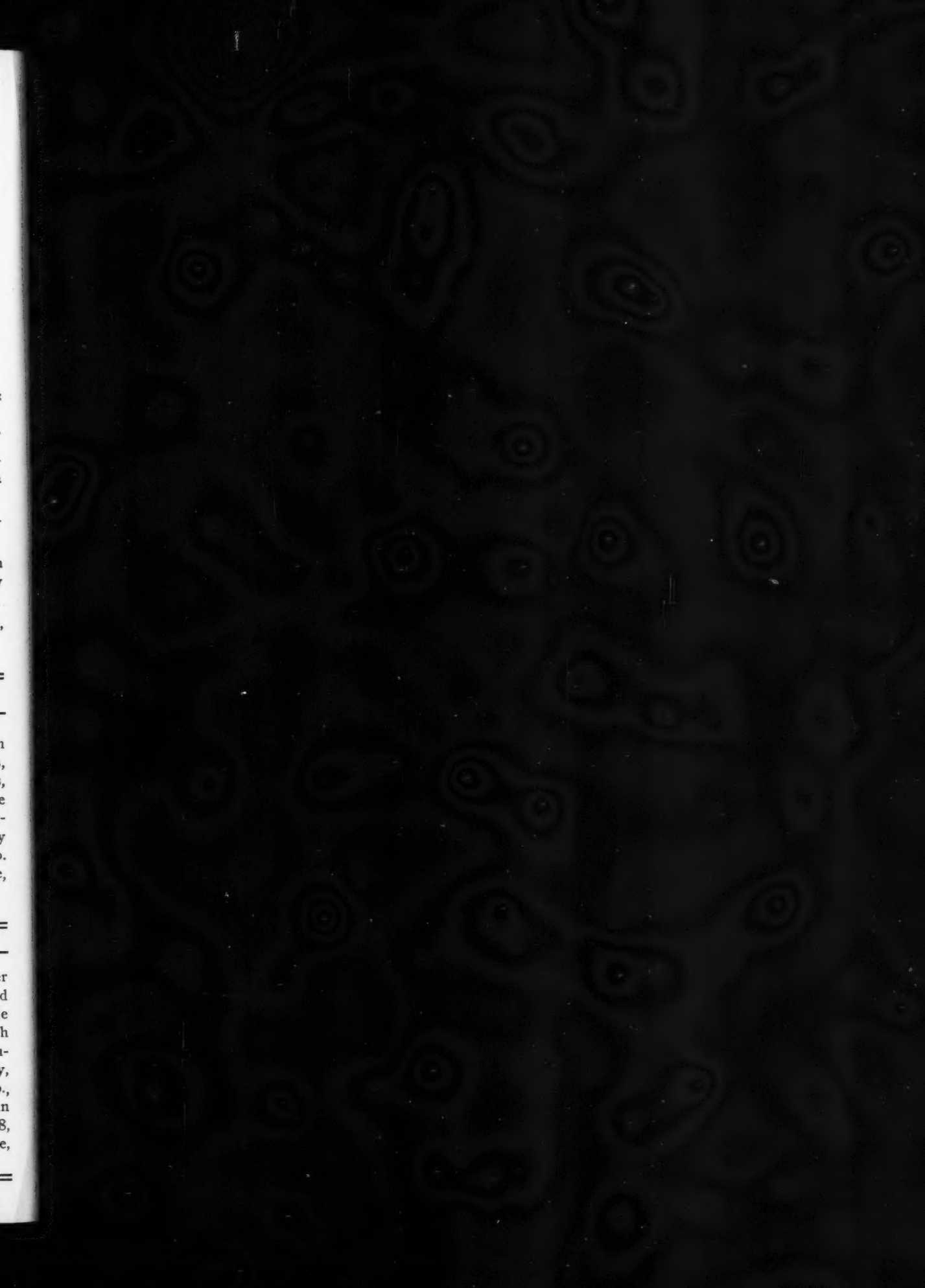
Thoroughly experienced dyeing yarns, raw stock, hosiery, rayons.

Acquainted in Southern territory, also familiar with mills in Massachusetts and Rhode Island. Satisfactory references.

Address Box No. 717, American Dyestuff Reporter, 440 Fourth Avenue.

SUPERINTENDENT DYER

Well versed in Celanese linings, taffetas, rayon crepes, silk mixtures and cottons. Vats, naphtols, developed, sulphur, direct and basic colors. Pads, jigs, reels and continuous machines. Able to take charge of any dye-house. Twenty-seven years' practical experience; will go anywhere. Wages secondary consideration. Good credentials. Address Box No. 726, American Dyestuff Reporter, 440 Fourth Avenue, New York.

POSITION WANTED

Resident manager, superintendent, colorist or dyer for the processing of cotton, rayon, silk, and mixed piece goods. Formerly connected with Hartsville Print & Dye Works, Hartsville, S. C.; Waldrich Bleachery, Delawanna, N. J.; Bronx Finishing Company, New York City; The Aspinook Company, Jewett City, Conn.; The United States Finishing Co., Pawtucket, R. I. Willing to locate immediately in any part of the country. Address Box No. 728, American Dyestuff Reporter, 440 Fourth Avenue, New York.